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NEW YORK SEATTLE

MOTORSHIP

Devoted to Marine Oil Engine and Motor Vessels

"MOTORSHIP" is entered as second-c.. at the Post-office at New York, N. Y., ... A., July, 1918, under the Act of March 3rd, 1879. Office of Publication, 27 Pearl St., New York, N. Y.

Issued Monthly
PRICE 25 CENTS
Domestic $3.00 per year
Foreign $3.50 per year

November, 1923
Vol. 8 No. 11

MARINE DIESEL ENGINES
FOR ALL CLASSES OF SHIPS

M. S. MUNCOVE
Length 353'6", Width 43'6", Depth 27'6"
Draft 23'6", Deadweight Capacity 4125 Tons
Single Screw, 1200 I.H.P., Oil Engine

McINTOSH & SEYMOUR CORPORATION
MAIN OFFICE AND WORKS - AUBURN, N.Y.

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EXCLUSIVE technical and non-technical articles on design, construction and operation of oil-engines and motorships by the world's foremost writers on marine engineering.

MOTORSHIP

PROFUSELY illustrated with photographic reproductions of the newest designs in international merchant motorship and Diesel-engine construction and auxiliary equipment.

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Vol. VIII | New York, U. S. A., November, 1923 | No. 11

(Cable Address—Freemote. New York)

This Motor-Tug's Fuel Bill Is $200 Per Month; the Steam Tug's Bill Is $1,200

One by one the Atlantic Harbors, which have been the last strongholds of the steam tug and have stoutly resisted the advent of the motor-tug, are admitting the great economy, handiness and general superiority of the modern oil-engined towboat, long after the Pacific Harbors had enthusiastically taken up the new style. With the new motor-tug pictured above added to the fleet of the Moran Towing & Transportation Co., the towing companies of New York are having their eyes opened to the great savings they can effect by motorizing their fleets. See page 762

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Moran Shows Way to New York Tugboat Owners

Saving in Fuel Bill of Motor Tug Pays Wages, Subsistence and Overhead

"ANY tug that will pull with this one," states George W. Brink, Marine Superintendent of the Moran Towing & Transportation Company, New York, in referring to the new motor-tug EUGENIA M. MORAN, "will use about $1,200 worth of coal per month, while our motor-tug will burn only about $200 worth of oil fuel. In other words the saving in the cost of fuel alone will pay all wages, subsistence of crew and possibly overhead.

"This tug has demonstrated that she is a success in every way. She can respond to any order for harbor towing. We will give her any assignment we will give our largest steamers, and it will be as well done. She will be the last of our units to be laid up should there be no work."

On the first editorial page of this issue of MOTORSHIP is an illustration of the motor-tug to which Mr. Brink refers in the above statement. She was put into commission in New York harbor during the latter part of July of this year. She is a wooden boat, 88 ft. in length o. a., 20 ft. beam and with a moulded depth of 10 ft. 6 in. Originally built for the Navy Department and equipped with steam, she was sold by the Government to the Moran Company without any guarantee. The hull was in very good condition, but the steam machinery was in poor shape. She could not have been used without re-boilering and without other work being done upon her. Her new owners decided, therefore, to make a trial of oil-engine power, which they had observed performing very satisfactorily and economically in other parts of the country.

Choice fell upon the type of engine built by the H. G. Trout Co., of Buffalo. This is of two-cycle design with the Leissner type of pre-combustion chamber, and in the larger sizes is directly reversible.

A 320 b.h.p. set was ordered, with four power cylinders of 14¼ in. diameter and 21 in. stroke, the independent scavenging cylinder being 24¾ in. diameter and having the same stroke. The full power rating is at 220 r.p.m.

In the Trout engine, which is of the port-scavenging type, the scavenge air is furnished by a double-acting pump, driven off the forward end of the crankshaft. This is in accord with Diesel engine practice and serves to emphasize that the Trout engine belongs rather to the Diesel type of engine than to the surface-ignition type, although of course, the Leissner system of combustion, which it employs, has characteristics associated with both types.

For simplicity sake—avoiding the use of camshafts extending along the engine—assembly groups are made of the fuel pumps and of the starting valves respectively. The fuel-pump group is mounted on the starboard side of the scavenger pump chamber and the starting-valve group across the forward end, as shown very clearly in the picture of the engine. A full description of the design was published in the MOTORSHIP of last December.

The installation in this tug was made by the John W. Sullivan Co., of New York, under the direct supervision of J. Frank Belford and George W. Brink, Operations Manager and Marine Superintendent respectively of the Moran Towing & Transportation Company.

After the engine had operated about two hours at the dock, the boat was taken out on her trial trip, which lasted about five hours, and was then put into commission. During that preliminary run, tests were made on the reversing ability of the engine, which was timed to change in eight seconds from full-ahead to full-astern, the headway of the tug being completely stopped in exactly one minute from the time of the astern bell.

Quite early in its service this tug began to demonstrate to its owners specific advantages that had not previously been suspected. For instance, she had been at work about one month when, at the close of a particular day, an emergency order went through for the delivery of 1,000 tons of coal to the Edison plant in Brooklyn. There were three steam tugs at the dock at the time, but the dispatcher ordered the motor tug to make the delivery. She left at once and completed her assignment.

None of the other tugs could have started without at least taking on water for the boiler. Records show that each of the steam tugs takes up at least two hours of a 10-hours working day getting water and coal aboard, while the EUGENIA M. MORAN is in position to give a full 10-hours service, her fueling being done about once a month.

Another advantage which this motor-tug has shown is that she draws 12 in. of water less than formerly, enabling her to go up the Hackensack River like the smaller boats of the fleet; but inasmuch as she has about twice as much power as they have, she can pull much heavier tows.

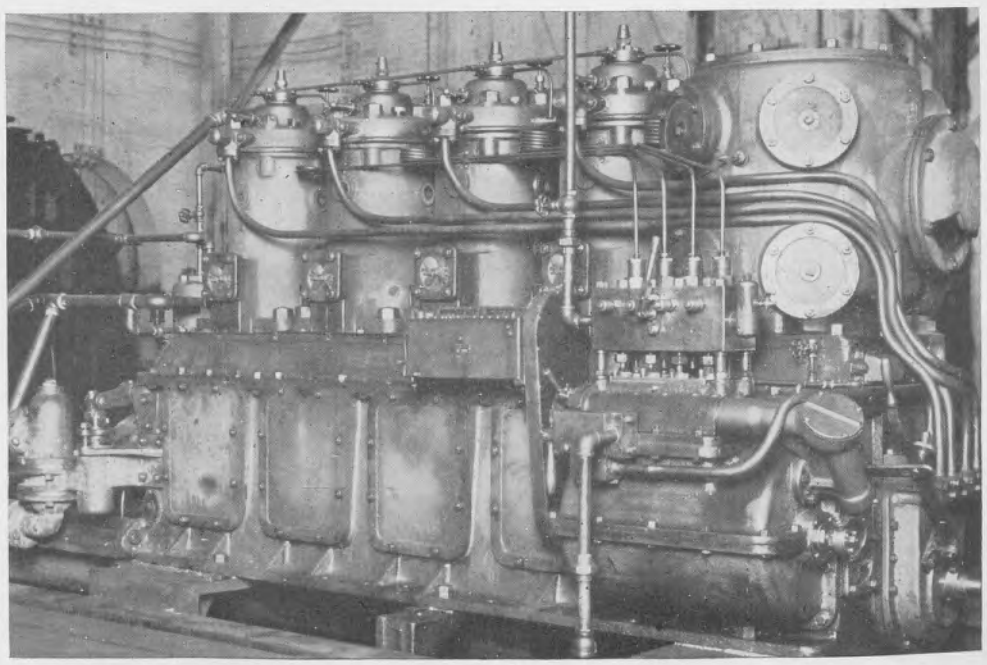
The motor-tug so soon gained the complete confidence of the Marine Superintendent that he promoted her to sea-going work with a double crew aboard. A Maxim silencer is installed, which so muffles the exhaust that for all practical purposes the gas escape may be described as inaudible. Because of this fact, the EUGENIA M. MORAN, which in profile and general appearance is similar to the steam tugs, is operating around the harbor, without attracting unusual attention. It is understood that the Moran firm is contemplating further use of the oil engine in its fleet.

Mallory Orders Werkspoor Diesel

C. D. Mallory & Co., of New York, have ordered a 525 b.h.p. Pacific-Werkspoor Diesel engine for installation in their tanker PINTHIS, of 1,750 tons d.w.c. This vessel was built in 1919 at Newburgh, N. Y., during the peak of the shipbuilding boom, and was equipped with a 500 shaft h.p. surface-ignition oil-engine. Her new Pacific-Werkspoor Diesel engine has six cylinders, 16½-in. bore by 23⅝-in. stroke, turning at 190 r.p.m. and is of the four-cycle, crosshead type. Delivery will be made within 100 days. The order was secured through O. S. Johanssen, New York agent of the Pacific Diesel Engine Co., of San Francisco.

Good Small Oil-Engine Business

As an instance of the growth of the low-powered marine oil-engine, it may be mentioned that the first Atlas-Imperial engine was put into service in 1916. It was of 250 h.p. During the next year the builders delivered 1,295 h.p., and 1,400 h.p. in 1918. Orders on hand at the present time bring the total Diesel output of the Atlas-Imperial Company up to 25,000 h.p. in engines up to 400 b.h.p.



Eugenia M. Moran's engine, showing the fuel-pump box in the foreground and the starting-valve box on the extreme right

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Cramp Converted Steamer SEEKONK

How Through the Installation of a 2,300 I.H.P. Cramp, B. & W. Diesel She Gained 1,000 Tons Capacity

WHEN the conversion of the Shipping Board steamer SEEKONK was first decided upon at the Wm. Cramp & Sons Ship & Engine Co., Philadelphia, we published a preliminary article on page 836, November, 1922. This interesting vessel having now passed successful sea tests we are enabled to give full information concerning the conversion work, and its accrued results.

The vessel was purchased by this well-known shipyard and converted to oil-engine power in order to demonstrate to the satisfaction of American shipowners that it is economical to acquire these steamers, of which there are 361 available at the specially low prices offered by the Board, and install Diesel power in the stead of their existing steam machinery.

The SEEKONK is a complete conversion, as all engine-room machinery has been scrapped and replaced with electrical equipment, excepting the windlass and capstan. The latter two machines were rebuilt to electric drive. This vessel is one of the Hog Island A-class boats, the hulls of which are generally regarded as being excellently constructed, so her new machinery makes her a high-grade motorship capable of competition with the finest vessels of her size constructed in Europe.

The work reflects much credit on the shipbuilders, on whose initiative and own account these conversions were made. Cramps' assumed all the financial risk and responsibility, forming an example to all hesitating owners and operators. It was the desire of the builders to make no compromise in effecting the change to motorship and to produce a vessel which would not be handicapped, but in every way built to compete on an even basis on the trade routes of the world. The steam drive accordingly was not retained for any of the auxiliaries, and both the main engines and engine-room auxiliaries embody all the latest ideas of Burmeister & Wain construction and arrangement.

The SEEKONK is one of over a hundred similar vessels that were built during the Emergency War construction at the Hog Island plant, and the size is very suitable for the general cargo trade, being strong and well built, and easy to drive due to its good under-water form. The size also permits of the single screw being maintained for the Diesel drive, with minimum hull changes required for its adoption.

Reference to our previous article will show that the gain in cubic capacity is greater than originally estimated, the total grain capacity now being 407,580 cu. ft. Through the elimination of the deep tank which was thrown into the hold forward of the old boiler-room, the fuel capacity has been reduced by 121 tons, so is now only 1,102 tons. In spite of this fuel-tank reduction, the cruising radius of the motorship is over three times greater than it was formerly. Her original fuel-consumption was over 27 tons per day of fuel-oil. This has been reduced to approximately seven tons per day at sea, and one-half ton per day at port.

Taking the aggregate sea and port fuel-consumption of the motorship as about one-fourth that of the steamer, or 308 tons required corresponding to the maximum storage capacity of the original vessel, and also the 120 tons reserve feed necessarily carried by the steamer, it will be seen that the net-cargo capacity has been increased by 1,035 tons through the conversion. The steamer, however, was credited with 7,825 tons total deadweight, or 77 tons more, which deducted from the 1,035 tons gives approximately in round numbers 1,000 tons more net-cargo carrying capacity for the motorship for the maximum radius of action of the vessel when operated as a steamer. Her principal dimensions as a converted motorship are as follows:

Name of ship	*Seekonk*
Displacement, loaded	11,440 tons
Cargo capacity, grain	407,580 cu. ft.
Cargo capacity, bales	332,210 cu. ft.
Deadweight	7,754 tons
Length o. a	401′ 7/16″

M.S. *Seekonk*—Fitting out at Cramps Shipyard, Philadelphia, prior to her trials. She will fly the United American Line flag

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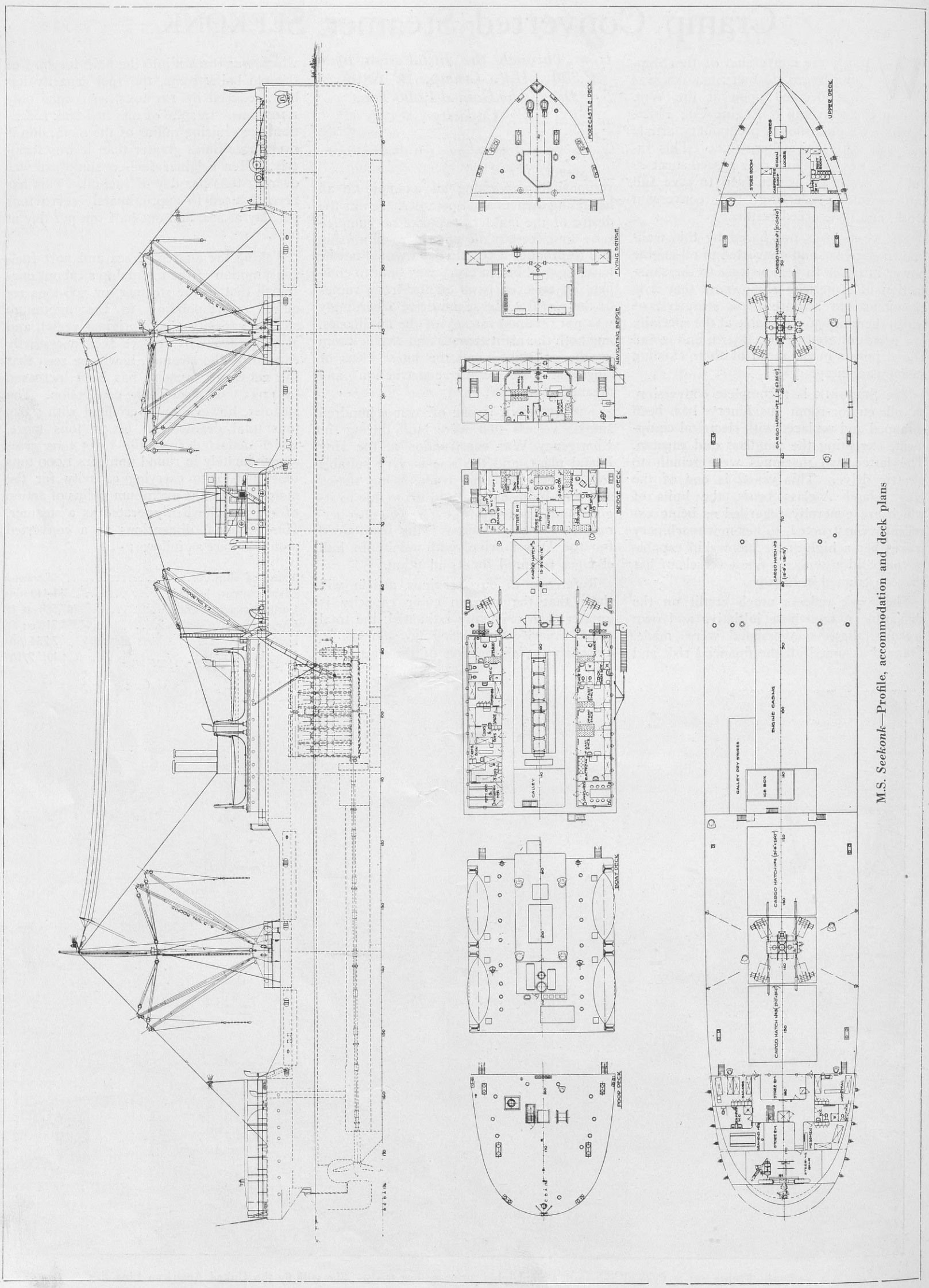

M.S. *Seekonk*—Profile, accommodation and deck plans

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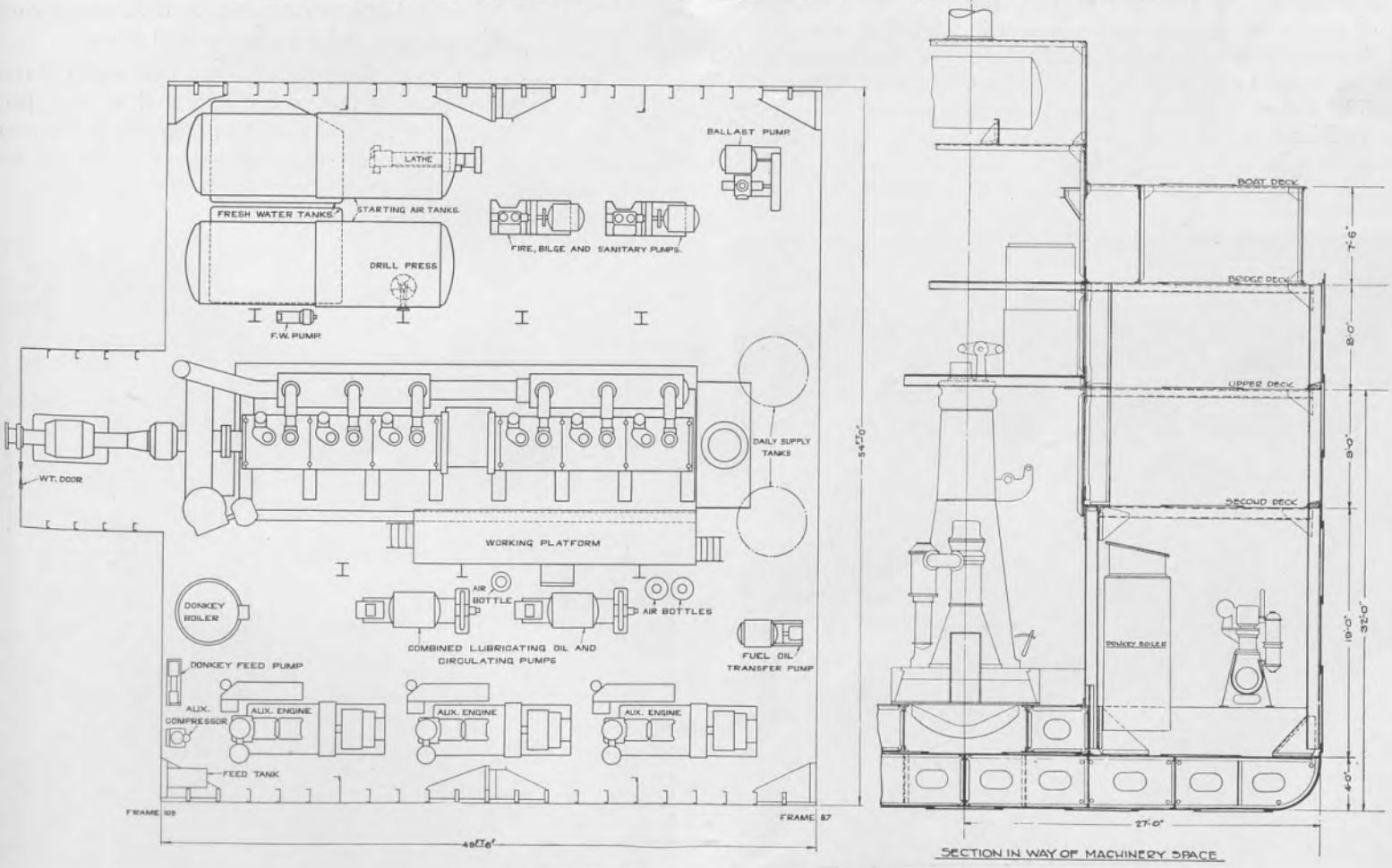
The Cramp-built long-stroke type Burmeister & Wain 2,300 i.h.p. Diesel engine of the motorship *Seekonk*



M.S. *Seekonk*—Engine-room plans and midship section

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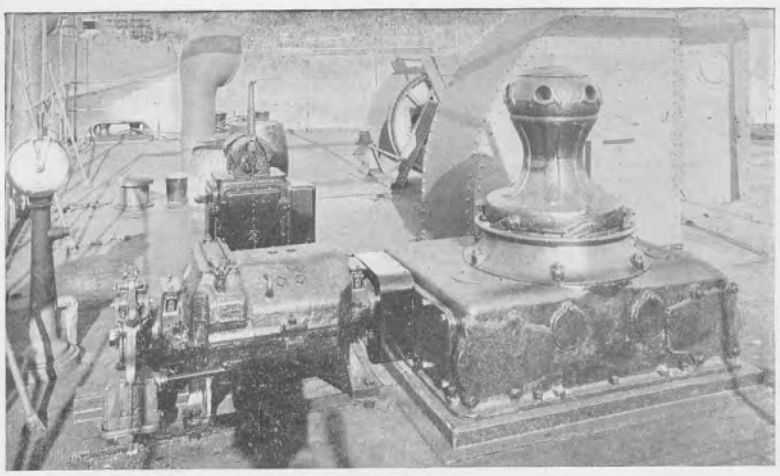
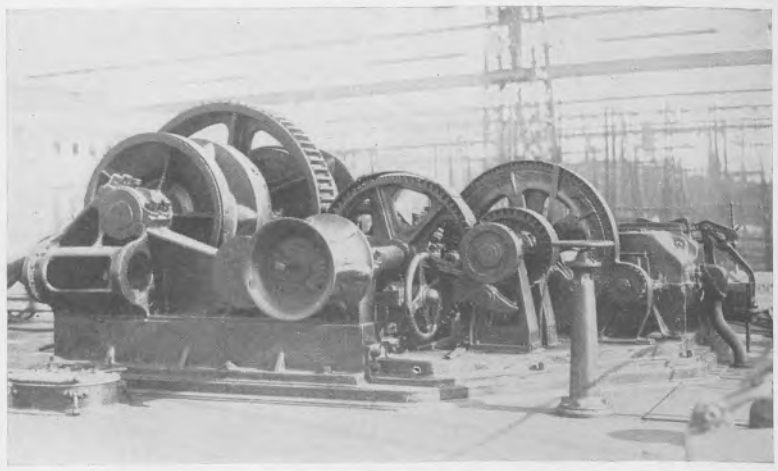


M.S. *Seekonk*—The capstan which Cramps converted from steam to electric



M.S. *Seekonk*—Electric windlass converted by Cramps from steam

Length b. p.	390′ 0″
Breadth, moulded	54′ 0″
Depth to upper deck	32′ 0″
Draft, loaded	24′ 5 3/16″
Power	2,300 i.h.p.
Fuel-capacity	16,768 cu. ft.
Speed, maximum loaded	10.5 knots
Speed, mean service loaded	10 knots
Engine speed	85 to 90 r.p.m.

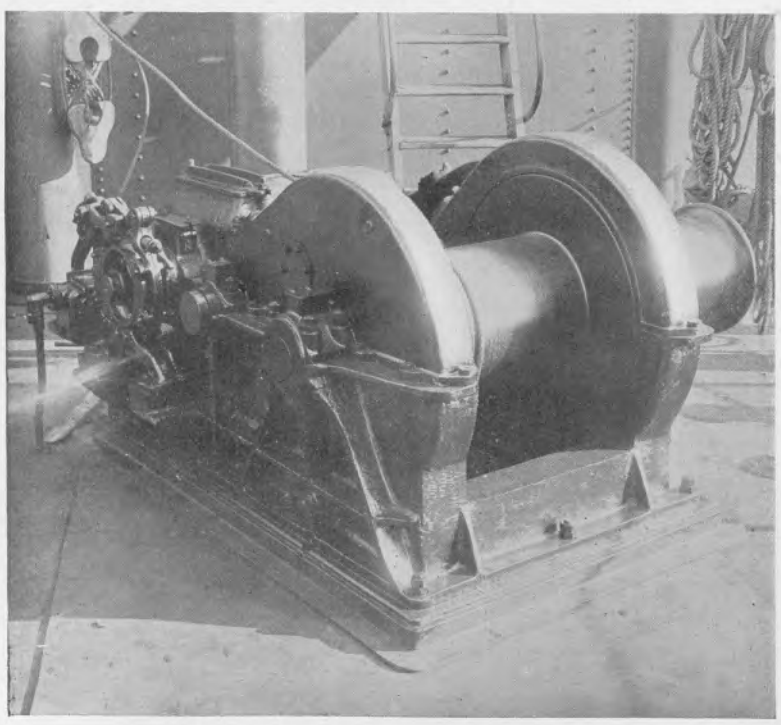
The annual saving of fuel as the result of the conversion will be over 140,000 bbls. if the vessel spends 182 days at sea and 183 days in port. But, the economy effected will vary according to the grade of oil used, and according to the current market prices of oil. While this is an important advantage in itself, it is far from being the only gain because there will be a saving of 8 men in the engine-room, and there will be the earning value of 17,768 additional cubic feet of cargo space, if the vessel runs fully loaded most of the time. The sum total of these savings cannot be estimated in advance. Obviously it will represent many times more than the interest on the cost of the conversion. As a matter of fact, the cost of conversion should not be figured in at all because the Shipping Board sells these boats at $5.00 to $7.00 a ton to any responsible owner guaranteeing to convert them to Diesel power.

Mean results of 69 Hog Island A-class steamers in service, taken from their logs when operating on a mean draft of 21′ 8″, is 10.33 knots with a mean consumption of 29.14 tons of fuel per day. Correcting for light draft condition brings the speed to approximately 10 knots, corresponding to that anticipated for the SEEKONK under similar service conditions.

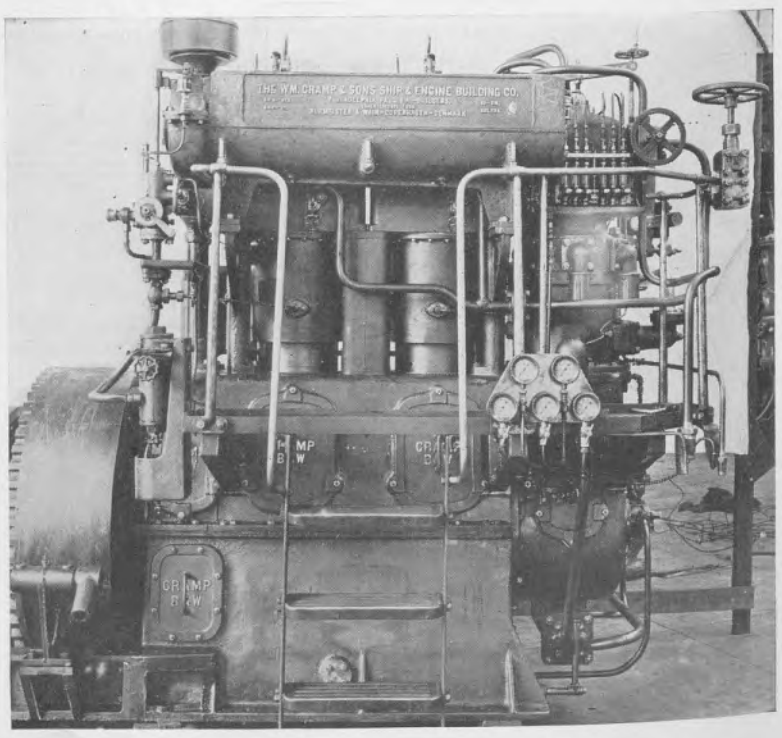
In place of the original reduction-geared turbine and water-tube boilers, there has been installed one of the Cramp-built new type of long-stroke, slow-speed Diesel engines, developed by Burmeister & Wain for single-screw vessels, and well adapted to conversion work. It has six cylinders of 29⅛ inches diameter, same as American-built CALIFORNIAN and MISSOURIAN's engines, but 59 inches stroke, instead of 45¼ inches, which allows the rated horsepower for this diameter to be developed at the corresponding lower r.p.m. The power of the engine is 2,300 i.h.p. when running at from 85 to 90 r.p.m. and is estimated will give the vessel a maximum speed of 10.5 knots loaded, and a mean speed of 10 knots in service. Although the rated power of the Diesel engine is nominally not as high as that of the geared machinery replaced, there is expected to be very little difference actually in the mean speed of the two vessels, due to the more uniform performance characteristic of the motorship.

In the engine-room, in addition to the main engine, has been installed on the starboard side, three twin-cylinder 100 b.h.p. auxiliary Diesel engines, each driving 67 k.w. generators. These engines are also of a new B. & W. design. Although of the same capacity as those in the CALIFORNIAN and MISSOURIAN, they are smaller in size due to their higher revolutions, which are 400 instead of 300 per minute. They also drive specially large three-stage air-compressors which, by means of a change-over valve control, can be made to furnish necessary main engine maneuvering air, thus dispensing with the usual motor-driven maneuvering-air compressor. These compressors can also supply injection air to the main engine, should its compressor for any reason be out of commission. On the starboard side also, are two combined motor-driven cooling and lubricating pumps, one of which is a standby; also the donkey boiler for heating purposes, reserve steam compressor and oil transfer fuel pump.

On the port side are two motor-driven plunger pumps for bilge and sanitary purposes, a rotary ballast pump and fresh-water pump, the two fresh-water tanks and the maneuvering air reservoirs.



M.S. *Seekonk*—Electric winch constructed by Cramps



M.S. *Seekonk*—One of the auxiliary Diesel engines

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The old horseshoe bearing has been replaced by a Gibbs type of thrust, lubricated from the main engine system. A new line shaft with line-shaft bearings was required due to the old shaft not having sufficient diameter. The old tail shaft, however was retained, as it had been made originally oversize for the steamer. A new manganese bronze propeller has been supplied of slightly less diameter and solid instead of built-up, as formerly used.

Very small hull changes were required to make the conversion. The screen bulkhead between the boiler-room and engine-room was removed, and new foundations constructed for the main and auxiliary machinery. A lubricating oil drain tank was located in part of the old reserve feed-tank, surrounded by the cofferdam.

The bathrooms and toilets, located as a steamer between engine and boiler room hatches, were moved to the location indicated on accompanying plan, the Chief Engineer being provided with a bath opening into his room. The quarters amidship have been slightly re-arranged, by which all licensed men are located on the starboard side of the vessel.

Aft, the chief alteration was made in the steering-engine room by re-arranging the partitions. This room formerly was longer fore and aft, which was shortened and extended to the sides of the vessel. On deck, the boom tables have been reconstructed and extended into houses supporting platforms, on which have been placed the winches and the booms correspondingly elevated. These houses also serve to house the winch resistors, and are used as extra electric storerooms and workshop.

The deck machinery is electric drive throughout. The steering gear is new, being of the electric-hydraulic design, as supplied by the American Engineering Co. The hand steering and telemotor have been retained, but relocated to suit the new arrangement. The windlass was changed over to motor drive by stripping it of cylinders, connecting-rods, etc., and fitting an extension to bedplate, on which is mounted additional gearing for coupling to a 45 h.p. motor.

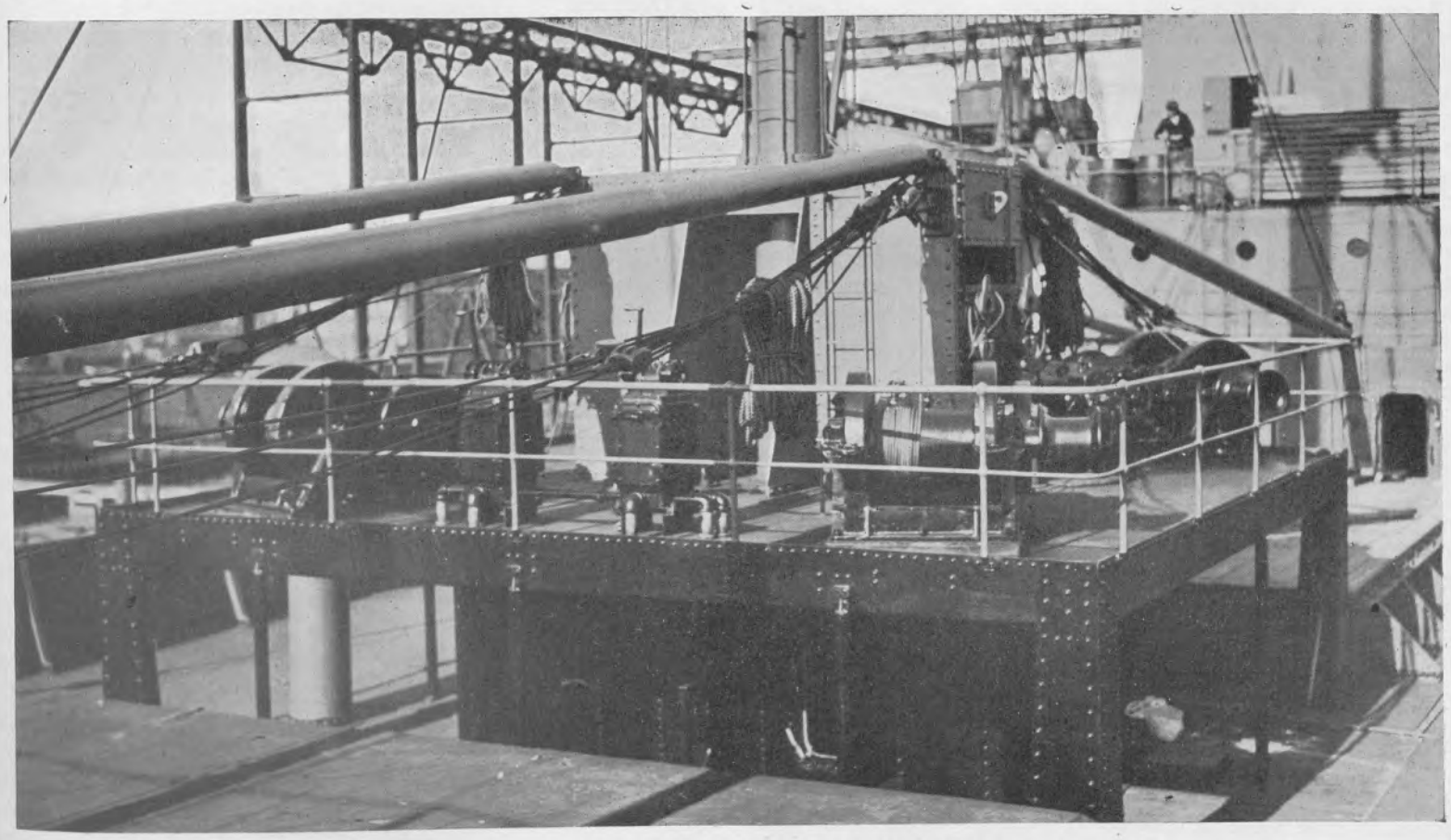
M.S. *Seekonk* on her trial run

Conversion of the capstan was nicely taken care of by turning it through ninety degrees and driving the worm shaft by means of a single spur reduction-gear, the motor being of the same size as the winch motors. The winches are entirely new and designed and built by the Cramp Company, based on experience gained with winches on the motorships WILLIAM PENN, CALIFORNIAN, and MISSOURIAN. They are compound geared with gearing entirely enclosed and contained within the gear housing, and running in oil. The motors are 20 h.p. rated capacity, instead of 30 h.p. as used on the former motorships, and capable of lifting 1½ tons on first gear, and 3 tons on second gear. Experience gained shows that the larger size winch, capable of lifting up to 5 tons, is unnecessary, as the stevedores would not handle over 3 tons on a single line.

The ice machine, located outside the engine-room, was changed to electric from steam engine, by motor direct coupled in its place. All deck electrical equipment is of the Westinghouse manufacture, while the engine-room motors and generators were furnished by the Diehl Mfg. Company, with Cutler Hammer controllers.

The engineer personnel consists of a chief engineer, 1st asst., 2nd asst., 3rd asst., electricians, and three oilers or motormen. There are two on a watch, an engineer and motorman, but due to the grouping of the principal auxiliaries on the starboard side, and in full view of the operating platform, the vessel is practically a one man operated job in the engine room.

In our December number we will give the trials result of this most interesting motorship, which were not completed in time for inclusion in this number. The Cramp Company expects to exhibit the SEEKONK at the time of the Marine Show, November 3rd to 10th, when the vessel will be at the United American Line's Pier, No. 90, North River, foot of West 50th Street, New York City.



M.S. *Seekonk*—Showing special constructed island platform for the electric cargo-winches

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Published Monthly in the Interests of Commercial and Naval Motor Vessels and for Recording International Progress of the Marine Heavy-oil Internal-Combustion Engine

Head Office: 27 PEARL STREET, NEW YORK, N. Y.

417 Montgomery Street, San Francisco 71 Columbia Street, Seattle, Wash.

Cable Address—Freemote New York.

Published by MILLER FREEMAN & COMPANY

MILLER FREEMAN .....President
THOS. ORCHARD LISLE.....Editor
A.M.S. Naval Engineers. A.M.I. Marine Engineers.
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Subscriptions rates: U.S.A. and Mexico, $3.00 per year; Canada and foreign countries in the postal union, $3.50. Single copies: United States, 25c.; Great Britain, 1/6. Other countries, 35c.

"Motorship" is published on the 20th of the month prior to date of issue, and all changes in and new copies for advertising must be in the hands of the publisher prior to the 5th of each month. Notice of discontinuance of advertising must be given before the 1st of the month, preceding issuance.

Position of the U. S. Shipping Board

RECENT figures of the finances of the U. S. Shipping Board have lately been made public and cover the period up to June 30th of this year. It is evident from these figures that the Board is in a position to withstand the most energetic form of competition that could be given by any foreign shipowning concern (should at any time a rate war be started) and to give adequate support to private shipowners. It is very interesting to note that during the last two years the Board has turned over to the Treasury a total of $111,000,000 which included $25,751,531 transferred on September 29th last. Altogether there has been deposited to the credit of the Construction Loan Fund under the Jones' Act $61,808,729,-148, so the Board has plenty of money for conversion to Diesel power of its own fleet of steamships, as well as for loaning to private shipowners for conversion of their steamers, should Congress authorize the use of the funds for this purpose. At present the Board is limited to its loans to private shipowners, to two-thirds the value of the ship at not less than 2 per cent. interest for new construction. This will soon be modified by Congress to availability for conversion work.

The fleet remaining in the Board's hands is now valued at approximately $230,000,000, representing the present day world's market value of vessels of similar type and condition. Gross assets of the Board on June 30th were $399,919,-781.43. Their liabilities were $47,514,581.26 and a reserve of $60,000,000 for fleet liquidation, restricted sales service and loan for vessels laid up. This leaves the net worth of the Board's assets at $292,495,200.17.

At the present time the U. S. Shipping Board has 361 steamships in which the machinery is in poor condition and in which the hulls are in good shape. It will be seen from the foregoing financial statement that the Board has enough money on hand to convert many of these ships to Diesel power, and thus render them capable of competing in the world's trade with the ships of any other nation. This Admiral Benson urges be done. An aid to successful competition not to be overlooked is the fact that the Board has the opportunity of securing fuel-oil at low prices. One of the latest contracts placed with one of our big oil companies calls for the supply of 1,065,000 bbls. every month at prices ranging from $1.14½ to $1.39 per bbl., according to port of delivery, during the year 1924. This quantity of fuel would drive 105 motorships of 12,000 tons d.w. at 11 knots loaded speed around the world, including the usual stops in port, with an aggregate fuel-bill of about one and a quarter million dollars.

Henry Ford's Great Motorships

Two 18,000 Ton Vessels With Sun-Doxford Diesels Ordered

FOR several years it has been known to us that Henry Ford has been giving attention to the possibilities of building oil-engined motorships; only the original proposal was to construct vessels for the transportation to foreign countries of Ford automobiles and parts via the Great Lakes, St. Lawrence River and Atlantic Ocean. Last month we announced his intention of ordering two motorships for ore, coal and coke carrying on the Great Lakes, which will be of the largest lake size. The route of these craft will be principally between L'Anse, Keweenaw Bay, Lake Superior, and the great furnace plant at River Rouge.

These two noteworthy vessels, which create an epoch on the Lakes, have now been ordered by The Ford Motor Co. of Detroit, one from the American Ship Building Co., of Cleveland, and the other from the Great Lakes Engineering Works, Detroit, Mich. Both ships will be single-screw. Two 3,200 h.p. at 85 r.p.m. Sun-Doxford two-cycle opposed-piston Diesel engines have been ordered from the Sun Shipbuilding Co., Chester, Pa.

Through the courtesy of W. B. Mayo, Chief Engineer of The Ford Motor Co., and of J. C. Workman, Chief Engineer of the American Ship Building Co., we are enabled to give some information regarding the boat to be built at the latter company's Lorain plant. It is planned to make her the most up-to-date and finest finished ship ever produced for Lake service. She will be constructed under the highest class of Lloyds' Register of Shipping, although being a domestic ship in every sense and form, we would prefer to see her constructed to the highest rating of the American Bureau of Shipping, especially as we consider that their rules for Diesel engine construction are even better than those of Lloyds. Her dimensions are as follows:

Displacement	18,000 tons
Power,	3,200 h.p.
Length, o.a.	611'0"
Breadth	62'0"
Depth, m.d.	32'0"
Draft, loaded	20'6"
Make of Engine	Sun-Doxford
Engine Speed	85 r.p.m.
Ship's speed	11.3 knots (13 land miles)
Fuel Bunkers, d.b.	200 tons
Builders of Hull	American Ship Bldg. Co.

Her hull will be constructed with transverse framing on the sides and longitudinal framing on the top and bottom. Altogether there will be 18 hatches, each with a 12 ft. by 40 ft. opening, spaced 25 ft. centers. As will be seen above, the loaded displacement will be 18,000 tons on a 20 ft. 6 in. draft. Her Sun-Doxford engine is expected to give her a loaded speed of 13 statute miles per hour (11.3 knots) under regular running conditions.

The main water bottom will be 5 ft. 6 in. deep at the center, and 5 ft. 3 in. at the sides, and will be divided into 14 water ballast compartments, but the space under the engine room, which is 4 ft. 2 in. deep, will carry 200 tons of fuel oil. The distance which this vessel will have to travel is not very great, so a large quantity of fuel is not required and the greatest possible deadweight capacity is given over to the ore and coal cargo.

Though the voyages are short, the Diesel engine will show to very great advantage because the laytime of a vessel in the Great Lakes ore-carrying business is relatively very small. Loading and discharging is faster than in any other trade in the world, not excepting even the transportation of oil in bulk. Vessels of the size of the Ford motorships have been known to berth under the ore spouts at Duluth and take about 14,000 tons aboard in an hour. The unloaders have been known also to discharge a cargo of that size in four hours. Except for delays at the ore docks originating from jams at the Soo or from the weather, the ore-carriers keep going at top

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speed from the opening of navigation until the ore dumps below the Lakes are piled high for the winter. From one aspect this ore trade is like a ferry service, and the Diesel engine will show in it all the economies usually shown by the oil engine in such service.

The main ballast-pumping machinery consists of two 15 in. electric motor-driven centrifugal pumps each capable of discharging 7,000 gallons per minute, in addition to this there are two 14 in. by 16 in. duplex motor-driven ballast drainage pumps. Auxiliary machinery, including mooring engines, steering engine and windlass of latest designs, will all be electrically operated. The galley ranges and vessel's heating will also be electrically operated.

It is interesting to note that the accommodation arrangements include an owner's suite, handsomely furnished and conveniently arranged. There will be the usual arrangements for accommodation for the officers and crew with separate galleys. Generally speaking, the accommodations are arranged for comfort and convenience.

Standard Transportation Orders Eight Diesel Tankers

Places Order of Thirty-two Diesel Engines with McIntosh & Seymour and Pacific Diesel Companies

FOLLOWING the success of their McIntosh & Seymour Diesel-engined tanker TROY SOCONY, the Standard Transportation Co., of New York, has placed a further order for eight tankers of the same class, but slightly larger tonnage; five going to the Sun Shipbuilding Co., of Philadelphia, and three to the New York Shipbuilding Corp., of Camden, N. J.

Each of these vessels will be propelled by twin McIntosh & Seymour Diesel engines of 350 shaft h.p. each, at 265 r.p.m. These engines will be of the four-cycle, single-acting type in six cylinders 13 in. bore by 18 in. stroke. In addition, the Standard Transportation Company has ordered sixteen Pacific-Werkspoor Diesel engines of 75 b.h.p. each, and two will be installed per boat, each direct-connected to a 50 k.w. generator, which will furnish power for the ships' auxiliaries and cargo pumps. The latter will be 12 in. by 12 in. duplex, built to the owners' standard, but as yet the pump order has not been placed.

This means that the Standard Transportation Company has ordered virtually at one stroke of the pen, a total of 32 Diesel engines aggregating 6,800 h.p. The new vessels will be 260 ft. long overall, by 254 ft. long b.p., 44 ft. breadth, 14 ft. depth and 12 ft. loaded draft. The carrying capacity per boat will be 13,000 bbls., or roughly 1,850 tons. All the motors and generators in the engine-room and for the cargo pumps will be furnished by the Diehl Manufacturing Co., of Elizabeth. Delivery of all eight ships is to be before May 1st, 1924. The air-compressors will be supplied by the Winton Engine Works, of Cleveland.

Sixteen-Thousand Horsepower Motor-Liner GRIPSHOLM

Drawings of Swedish-American Line's Twin-Screw B. & W. Diesel-Propelled Passenger Vessel

ON the next page we are enabled to publish for the first time in any magazine, reproductions of drawings of the new motorship GRIPSHOLM now building at the Armstrong Whitworth Shipyard, Newcastle, England, to the order of the Swedish American Line, of Stockholm. Of all the large passenger motorships now under construction in various countries, the GRIPSHOLM will be the highest powered. She is a twin-screw vessel propelled by two Burmeister & Wain, double-acting, four-cycle type Diesel engines together developing 16,300 indicated h.p., or 13,500 shaft h.p.

To Dan Bröstrom, Swedish shipping magnate, credit is due for the enterprise shown in laying down this remarkable vessel, and we recall an interview with him on board the DROTTINGHOLM about two years ago, just prior to his return to Sweden after a visit to New York, when he told us of his plans to order this ship. Within another year his dream should be fulfilled and this vessel be en route to the United States on her maiden voyage. On the engineering side credit is due to Burmeister & Wain for courage in constructing the Diesel engines which make this vessel possible. The cost of this ship will be over $4,000,000, of which at least one-third will be absorbed by the machinery. Her leading dimensions are as follows:

Displacement	23,500 tons.
Gross register	17,000 tons.
Length	574.6′
Breadth	74′
Depth	76.6′
Draft	29′
Passenger capacity	1,661
Daily fuel-consumption	50 tons.
Speed	17 knots.

It was only a short time ago that many shipowners and naval-architects almost ridiculed proposals to construct Diesel-driven passenger vessels of this size and power for Transatlantic service, believing that such could only be built in the dim future. Yet to-day there are under construction 20 motorships over 4,000 shaft h.p. Of these 16 are of 5,000 shaft. h.p. or over, and 4 over 9,500 shaft h.p. The tonnage of these 20 ships exceeds 250,000 tons, indicating the extraordinary development that is taking place. Meanwhile there are still a number of shipping men who consider that even the low powered Diesel-driven freighter has not yet reached the practical stage. Such beliefs can only be formed through men not being posted with what is actually taking place.

The GRIPSHOLM will carry a total of 1,661 passengers, of which 162 will be in the first-class, 481 in the second-class and 1,018 in the third-class. In addition she will have accommodation for the officers, engineers, stewards and crew, so that well over 2,000 people will be on board when she makes her maiden voyage across the Atlantic.

The Swedish American Line, which will operate this vessel, is comparatively young, having only come into existence seven years ago. In this very brief space of time it has developed into one of the largest shipping enterprises in Scandinavia and carries a steadily increasing volume of passenger and freight traffic. Its principal passenger ships are the STOCKHOLM, DROTTINGHOLM and the KUNGSHOLM. The new vessel GRIPSHOLM will be a little larger than any of these three vessels. In every way she will be a modern vessel, not only as far as her machinery is concerned, but all her passenger accommodation and equipment.

Unfortunately, the drawings are not as clear as they might be, owing to the tremendous reduction from a length of 600 ft. down to 8 inches. But, the drawings are clear enough to give a general idea of the lay-out. Particular attention is called to the small space occupied by the machinery. Absence of boilers will mean that the passenger accommodation in the neighborhood of the machinery space is just as cool as in any other part of the ship, whereas on nearly all existing passenger liners cabin accommodation around this quarter is particularly warm and unpleasant. Although there are two smoke-stacks, these principally form ventilators, and are also used to carry the mufflers to which the exhaust from the main Diesel engines and auxiliary Diesel engines are carried.

Reference to the drawings of the passenger decks will show that very little space is required for the exhaust pipes to run to and through the boat deck, so that the cabin accommodation on these three decks covers almost the entire space. Aside from the economy of this ship—as only 50 tons of oil per day will be burned—the absence of smoke and cinders and vibration will add greatly to the comfort of the passengers, as even with oil-firing on steamships the after part of the promenade deck is continuously covered with a fine sooty ash. But, the Diesel engine combustion is too complete to enable this to occur.

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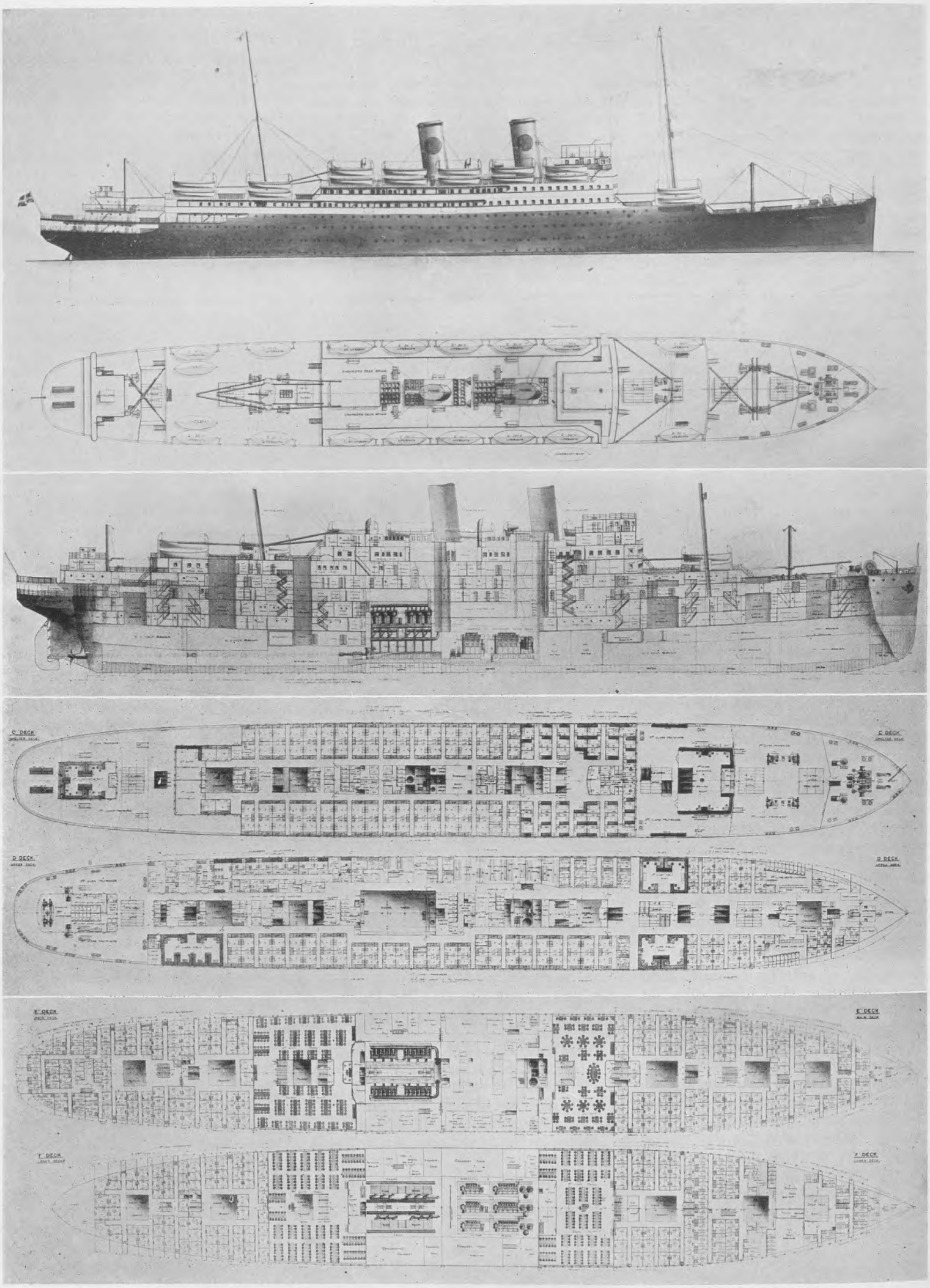

THE WORLD'S GREATEST DIESEL-DRIVEN TRANSATLANTIC LINER

Swedish-America Line's new motorship *Gripsholm*, in which twin Burmeister & Wain double-acting Diesel engines of 16,300 i.h.p. total power are being installed

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Benson Again Urges Steamer Conversion

Says If Congress Approves Board Will Convert Some of the 361 Useless Steamers and Will Loan Conversion Money

"BY possession of motorships converted at low initial cost from the Board's steamers, of which there are 361 that need new engines, American shipowners will at once be placed in the privileged position heretofore enjoyed by their foreign competitors." This was stressed by Admiral William S. Benson of the U. S. Shipping Board in a paper written by him, but read by Norris R. Sibley before the Propeller Club, New York, on October 25. For this reason the Admiral will urge the following constructive measures when Congress convenes in December.

"*First,* the extension of the benefits of Section 11 of the Merchant Marine Act of 1920 to the conversion of American flag steamers of the best and most efficient type into reliable and economical motorships. Should Congress approve such modifications, the Board can then loan two-thirds of the conversion cost at a reasonable rate of interest, with payments extending over a period of years, thereby greatly facilitating the financing of conversion projects.

"*Second,* the adoption of a suitable policy of standardization for the ultimate object of reducing production costs of Diesel machinery and auxiliaries. Considerable study has already been given to this subject and further progress is anticipated with the co-operation of the builders.

"*Third,* the conversion of a number of the Board's own steamers to serve the long distance routes, for the two-fold purpose of reducing cost of operation and to give impetus to domestic Diesel construction.

"These measures," says Admiral Benson, "are also urged to all men of vision who believe in an adequate and self-supporting merchant marine, and an equitable share of the world's commerce."

Included in this interesting paper are actual operating comparisons, between two ships of the same size owned by the Board, one the single-screw, quadruple-expansion engined steamer ETHAN ALLEN of 3,200 i.h.p. at 75 r.p.m. The other is the twin-screw motorship WILLIAM PENN, powered by two B. & W. four-cycle Diesel engines aggregating 4,200 i.h.p. at 105 r.p.m. Both have high grade installations and were built by the same yard, but are operated by different concerns for the Board over long trans-Pacific routes. Accurate information is available for the WILLIAM PENN over three round-world voyages, totalling 84,000 miles, but only reliable figures on the steamer for her last voyage are procurable. Both ships have these dimensions, namely,

Length, b.p.	439'6"
Breadth, moulded	60'0"
Depth, moulded	36'9"
Draft, summer load	28'4"

On the three round-world voyages of the motorship WILLIAM PENN, the adjoining most interesting figures are given by Admiral Benson. The vessel is now on her fourth voyage.

The steamship ETHAN ALLEN has been in service a longer period. The steamer figures as stated are per latest trip, while the comparison figures, reproduced below, which Admiral Benson gives of the motorship are an average of her three voyages.

Admiral Benson shows that on a ton of fuel the WILLIAM PENN covers a distance 2¾ times greater than the steamer ETHAN ALLEN. The steamer's port consumption is vitiated by the necessity of maintaining steam up while in Oriental ports for emergency. This, of course, is not required by the motorship, and is an advantage in the latter's favor hitherto overlooked by shipowners. Judging by the port consumption of the steamer, we may state this represents a substantial sum.

The Admiral goes on to say that the foregoing comparison leaves no doubt as to the substantial savings in fuel, water, engine-room wages and subsistence realized by the motorship, not to speak of other indirect advantages such as increased cargo capacity, greater flexibility of operation with consequent smaller operating expenses. A study of the figures indicates that the distance steamed by the motorship on three voyages averaged 27,354 nautical miles compared with 22,951 miles for the steamship. Even with this greater mileage the motorship only consumed 1,402 tons of fuel at sea, averaging 11.06 knots, compared with 3,220 tons by the steamer, which averaged but 10.78 knots.

If the average speed of the steamer ETHAN ALLEN had been increased to 11 knots and the distance covered to over 27,000 miles, the results would be even far more favorable to Diesel power than already shown by this comparison. The difference in port consumption is extraordinary.

We are glad to publish the Government's official figures because they endorse figures we have previously given which have been regarded in some quarters as exaggerated. Also, they absolutely refute the ridiculous statement made in a paper given at the Propeller Club at the same meeting, by W. W. Smith, Chief-Engineer of an important Atlantic Coast shipyard.

Heavy repair bills and high maintenance cost are constantly put forward by many opponents to oil engine power. In this connection it is interesting to note that *the engine-room repair bill for a single voyage of the steamer* ETHAN ALLEN is $3,501, *whereas the total engine-room repair bill of three voyages of the* WILLIAM PENN *was* $112. On the first voyage the motorship's deck machinery suffered a repair bill of $393, whereas the steamer had none. However, no repair was necessary to the electric deck machinery of the motorship on the second and third voyages, indicating that the repairs were some minor adjustments.

The Admiral pointed out that, due to hasty war construction, a number of the Board's freighters were equipped with machinery of untried design. At the present time the Board controls 262 vessels with geared turbines and water-tube boilers, 14 with turbines and Scotch boilers, and 85 with reciprocating engines and water-tube boilers. This represents a total of 361 vessels variously affected—said the Admiral—by deficient steam machinery, resulting in the majority being laid-up for some time But the hulls are of good competitive design, generally well built and fairly well preserved, so are most logically suited for Diesel propulsion. If this conversion can be effected at reasonable cost, he continued, these vessels should prove competitive and valuable additions to the American Merchant Marine.

MOTORSHIP WILLIAM PENN

	1st Voy.	*2nd Voy.*	*3rd Voy.*
No. of ports called	18	15	18
Days at sea between pilot stations	109	104	96
Total distance steamed, miles	27,769	26,977	28,317
Average speed, knots	10.65	10.83	11.29
Total fuel at sea, tons	1,419	1,394	1,395
Total fuel in port, tons	93	106	73
Total fuel, sea and port, tons	1,512	1,500	1,468
Miles per ton of fuel	19.6	19.3	20.29
Average daily fuel at sea, tons	13.04	13.04	14.53
Average daily fuel in port, tons	0.75	1.08	0.64
Average daily fresh water, tons	2.4	3.	2.16
Total cost repairs, engine room	Nil	Nil	$112
Total cost repairs, deck machinery	$393	Nil	Nil

ACTUAL STEAMER AND MOTORSHIP COMPARISON DATA

	S.S. Ethan Allen	*M.S. William Penn*
No. of ports called	21	17
Days at sea between pilot stations	88.7	103
Total distance steamed, miles	22,951	27,354
Average speed, knots	10.78	11.06
Total fuel at sea, tons	3,220	1,402
Total fuel in port, tons	1,059	90¾
Total fuel, sea and port, tons	4,279	1,493
Miles per ton of fuel	7.12	19.71
Average daily fuel at sea, tons	37.47	13.29
Average daily fuel in port, tons	22.79	0.82
Average daily boiler water, tons	9.9	Nil
Total cost repairs, engine room	$3,501	$112
Total cost repairs, deck machinery	Nil	$131

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McIntosh & Seymour's New Big Diesel

American-Designed Marine Engine of 2,250 I.H.P. Has Completed Successful Trials at Auburn Works

HAVING firmly established the reputation of its engines up to 1,200 i.h.p. by a well filled record of continued operation in a large number of ships, the McIntosh & Seymour Corporation has met the request for bigger engines by producing a unit of 2,250 i.h.p.

This new engine was first turned over about two months ago, but, until it had been put through the complete series of tests generally demanded of a new engine, the builders preferred to have no word published about it. Now they have incorporated it among their standard productions and are ready to accept orders for merchant marine engines of this size.

Like all the machinery produced by this company, the new big engine, as we found on a recent visit, not only bears visible evidence of the most careful study and the best shop work, but demonstrates the benefit of them in her quiet, easy running and smoothness of operation. She is a great credit to those responsible for her design and construction.

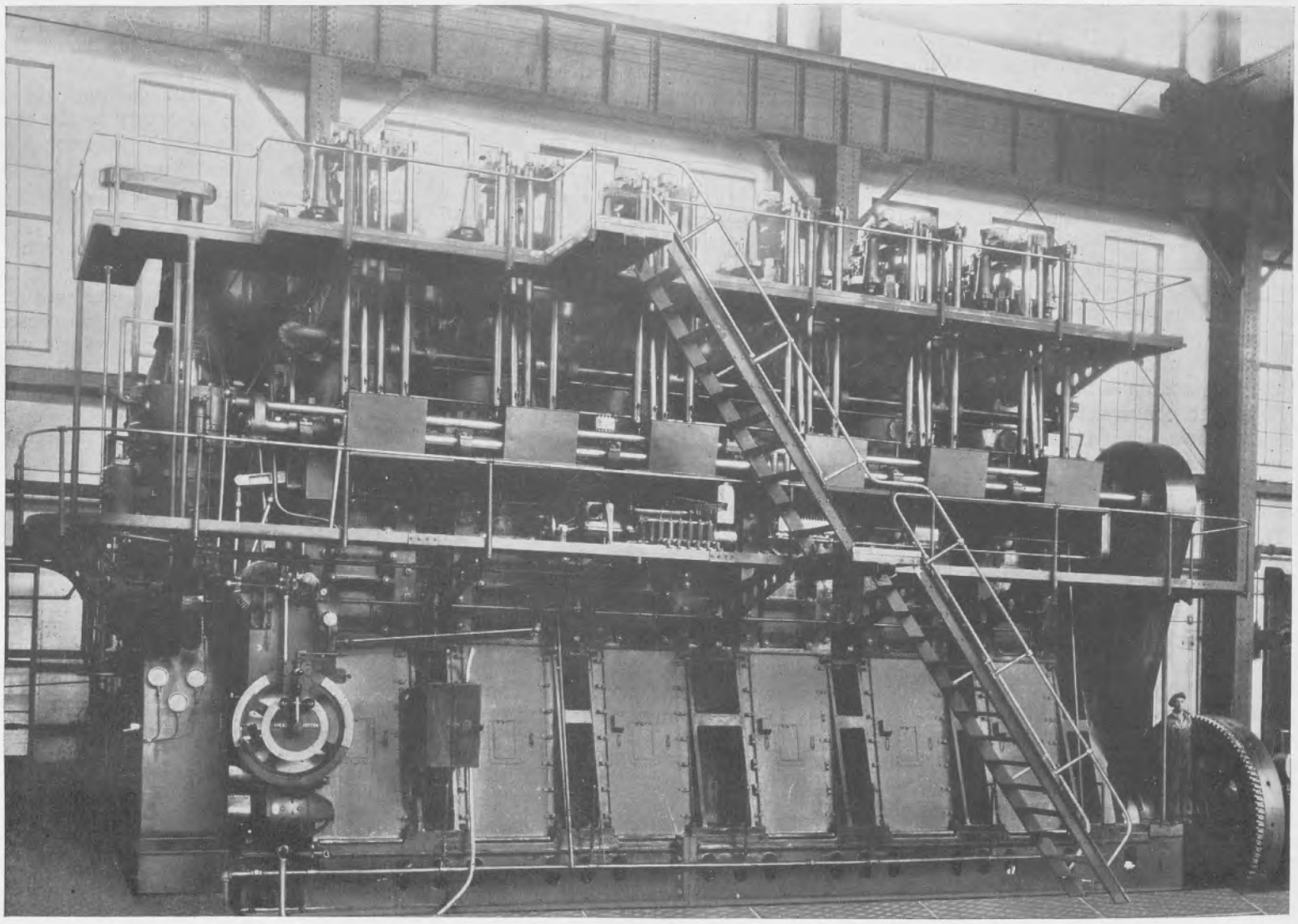
Of the four-cycle type, the engine develops its rated horsepower from six-cylinders of 28 in. diameter, with a stroke of 48 in. at 115 r.p.m., the corresponding shaft power being 1,700 b.h.p. It complies with the highest requirements of the Classification Societies and responds therefore to the demand of any shipowner. The weight is about 318 tons, equivalent to 315 lbs per i.h.p.

In general arrangement the design follows that of other sizes of marine engines built with conspicuous success in the same shops. This can be gauged by the view of the big engine on this page, when compared with the other McIntosh & Seymour engines that have frequently been illustrated in MOTORSHIP. In an early issue of this magazine the new engine will be described in detail, but, owing to the great demand made on our space this month by the completion of an unusual number of motor vessels of particular importance, we have been obliged to pare down all articles, and can do no more here than refer to the special departure in design which is a notable feature of this latest example of McIntosh & Seymour design.

The term "notable feature" is employed with deliberation and intent, for the electrically operated reversing mechanism of this engine is novel, sensible and practical. It is so much more in accord with the general American way of performing an auxiliary operation than the compressed air type of servo-motor is, that its adoption by a leading manufacturer at once opens a battle. It cannot be gainsaid that the electrical way is the American way, and while so many examples are now being furnished in motorships of the economy of electrical operation of the auxiliaries, it seems like an anachronism to employ compressed air for the reversing movement. There are, of course, many considerations to be weighed. The air system having been practically in universal use down to date does not need to have its case stated, but there is this to the electrical method: it is always standing instantly ready without any waste whatever.

In the McIntosh & Seymour arrangement the operator has only one lever for maneuvering. This lever projects horizontally beyond the face of the control ring. Immediately it is moved, it makes an electrical contact causing the electric motor to operate and move the control mechanism into the desired position. This operation is terminated as soon as the follow-up pointer connected with the control mechanism comes into line with the main operating lever.

When the main lever is shifted into starting position, the electric motor, by means of gearing and appropriate links,



New 2,250 i.h.p. Diesel marine engine which has been completely developed by the McIntosh & Seymour Corporation. The electrical maneuvering control, which unifies all regulation of the engine in a single lever, is seen on the lower left-hand side

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begins to rotate the starting shaft—which, as in all McIntosh & Seymour engines, is located behind the camshaft—until the air starting push-rods take up the position where they can be operated by the cams. A progressively further movement of the main lever cuts out the starting valves and brings the fuel valves in operation. Still further movement of the main lever affects the operation of the fuel pumps by altering their stroke in the standard McIntosh & Seymour manner.

Although mention has just been made above of individual movements of the main lever, these correspond really only to certain arcs in the whole movement of this lever, which can be operated straight through as fast as it can be moved, the electrically operated follow-up mechanism taking care of the completion of the operation. One-half of the arc movement of the main lever is given over to ahead running, and the other half corresponds to astern rotation of the engine.

If the engine is running full ahead when the order is given to go astern, the main lever is pulled down from the top of the control ring and swung right around the circle until it comes into upper position on the other side. Where it passes from the ahead part of the ring to the astern part at the bottom center, the electrical mechanism moves a rod controlling a rocker shaft which lifts the rollers of the air, exhaust and fuel valves from contact with their cams, while another rod movement shifts the camshaft endwise, putting the other set of cams under the rollers which then return to their original position for operating the valve levers. Immediately thereupon the same operations take place consecutively as ordinarily occur in the starting of the engine. Everyone of the electrically-operated movements is so timed and interlocked that no error can be made. It may be added that there is a valve which automatically shuts off the injection air when the engine is being maneuvered.

On the upper part of the arcs are the sectors corresponding to fuel control. If it be desired to make a very fine adjustment of the amount of fuel fed to the cylinders at each stroke, there is a subsidiary electrical control for performing this operation. A separate push button on the ahead and astern arcs permits the circuit to be closed temporarily, so that the electrical mechanism will operate only while the engineer's finger is on either these buttons. These buttons are only effective after a transfer switch has been thrown, which passes the current from the master switch to them.

A red lamp above the mechanism is lighted continuously. It would be extinguished if the current failed.

Possibly no better indication can be given of the automatic character of this electric reversing mechanism than the fact that every visitor to the McIntosh & Seymour works is invited to operate the main lever just as he desires—he cannot go wrong.

SMITH'S THEORIES AND BENSON'S FACTS

It seems incomprehensible that an engineer holding a responsible position with an important Eastern shipyard could stand up before common sense shipping men in broad daylight and make such extraordinary statements as did W. W. Smith before the Propeller Club, New York, on October 20th.

In a paper alleged to be dealing with the economies of the design and construction of marine machinery Mr. Smith claims, in defiance of modern experience, that in powers over 1,000 h.p. the steam engine has an economic advantage over single-acting oil-engines in practically all cases, and that even in powers from 500 to 1,000 h.p. the excess weight and cost of the oil engine in many instances gives the advantage to steam machinery. Also that from 2,000 to 4,000 h.p. the turbine with superheated steam is considerably better than the single acting oil engine.

Were it not for the important position held by Mr. Smith, and the possible influence on the actions of non-technical shipowners, we should have treated this paper in a similar manner to the many ravings that reach the editorial sanctum from the pen of irresponsibles, namely file it in the W.P.B. As it happened, Mr. Smith's talk was followed by a paper written by Admiral W. S. Benson of the Shipping Board, giving actual operating comparisons between the steamer ETHAN ALLEN and the motorship WM. PENN, showing that on round-the-world voyages very great economies were effected by the Diesel drive in addition to increased cargo capacity *and much lower repair bills.*

This is what Mr. Smith said:

"The selection of the best type and design of machinery is a problem in economics. I have had the opportunity of studying a large number of estimates and comparisons for various types and designs of machinery, from which I have drawn conclusions as to the most suitable types for average vessels. These I will give as a rough guide only.

"Up to about 500 horsepower the oil engine is usually best. The use of oil engines in these powers is growing rapidly, due chiefly to the simplicity of the machinery and to the low cost of operation. For the same reason, the two-cycle, single-acting, airless-injection engine seems preferable.

"From 500 to 1,000 horsepower, an oil engine of the right design will have an advantage; but it cannot be too heavy or expensive. In many cases the excessive weight and cost of the oil engine gives the advantage to the steam engine.

"From 1,000 to 2,000 horsepower, the steam engine has the advantage over the single-acting oil engine in practically all cases. On the other hand, the two-cycle, double-acting oil engine would, if available, have the advantage.

"From 2,000 to 4,000 horsepower, the geared turbine with superheated steam is considerably better than the single-acting oil engine. In this case, also, a two-cycle, double-acting engine would be advantageous.

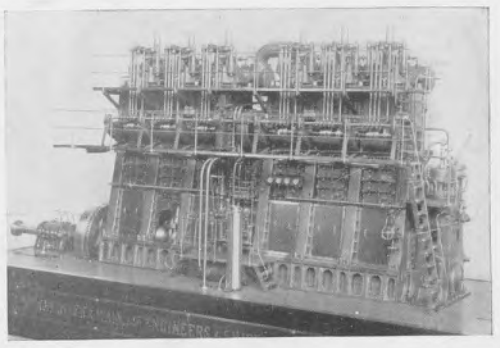
"From about 4,000 horsepower up, the geared turbine with superheated steam and water tube boilers of the right type has the advantage, and is likely to keep it for some time.

"There is, of course, a wide variation in service conditions, which will materially affect the selection of machinery in specific cases. Also, the lines of demarcation which are given are only very rough approximations. The oil engine is making progress, but it has not fully arrived yet. For economic reasons, the two-cycle, double-acting engine is necessary for the larger powers. When it is available, it will have important advantages in many cases."

It is to be hoped that American oil-engine builders will promptly and vigorously take up the cudgels of offense against such inaccurate statements. Our pages are open for comments or for figures from Mr. Smith if he can substantiate his claims, which we hold have no foundation. The worthy gentleman appears to be what is generally termed "talking thru' his hat."

Another Dutch Company has decided to convert one of its steamers. The Stoomvaart Maatschappij "Rotterdam," managed by W. Ruys & Zonen, have decided to take out the geared turbines from their vessel TURBINIA and replace them with Swiss built Sulzer Diesel machinery of 1,250 shaft h.p. This vessel, which is 331 ft. long, 48 ft. beam and 22.2 ft. in depth is registered at 3,164 tons gross.

Burmeister & Wain, of Copenhagen, have an exhibit adjacent to the Wm. Cramp Shipyards, both at the Marine Exhibition, New York. This exhibit consists of a model of the motorship AFRIKA, as well as a complete working model of one of her Diesel engines which is of the same type and power as installed in the American motorship WILLIAM PENN. There will also be a model of the Transatlantic motor-liner GRIPSHOLM, building for the Swedish America Line by Armstrong, Whiteworth & Co., in which Burmeister & Wain double-acting Diesel engines totalling 16,300 i.h.p. will be installed.



Model of Burmeister & Wain 2,200 i.h.p. Diesel engine exhibited at the New York Marine Show

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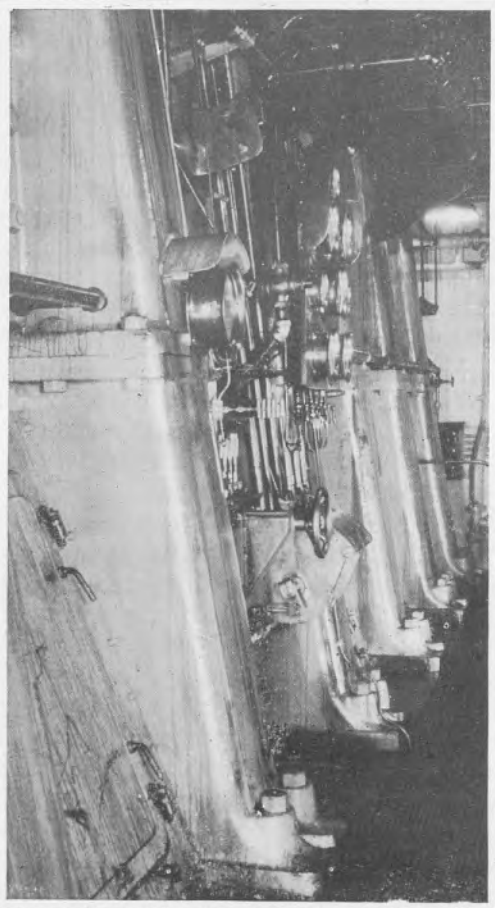
Single-screw New York-Werkspoor Diesel-engined motorship *Ashbee* on her trial run

Converted Motorship ASHBEE Ready for Service

S. B. Vessel of 5,500 Tons D.W.C. Equipped With Diesel Engine by New York Shipbuilding Corp.

AS a demonstration to shipowners of the possibilities of acquiring sound hulls from the Shipping Board for conversion to Diesel power, and also for the purpose of gaining experience as to the exact cost of this class of work, the New York Shipbuilding Corp., of Camden, N. J., decided about a year ago to take a laid-up steamer and install in her one of the Werkspoor type Diesel engines which that company is now building. The choice fell upon a vessel that had been built in one of the Southern yards under a war-time contract, and which could be deemed representative of the type of hull which the Shipping Board is willing to sell at a nominal figure for conversion to Diesel power. This vessel which measures 334 ft. 6 in. in length and has a moulded breadth of 48 ft. with a moulded depth of 27 ft. 6 in., has a deadweight capacity of 5,532 tons on a draft of 22 ft. 6 in.

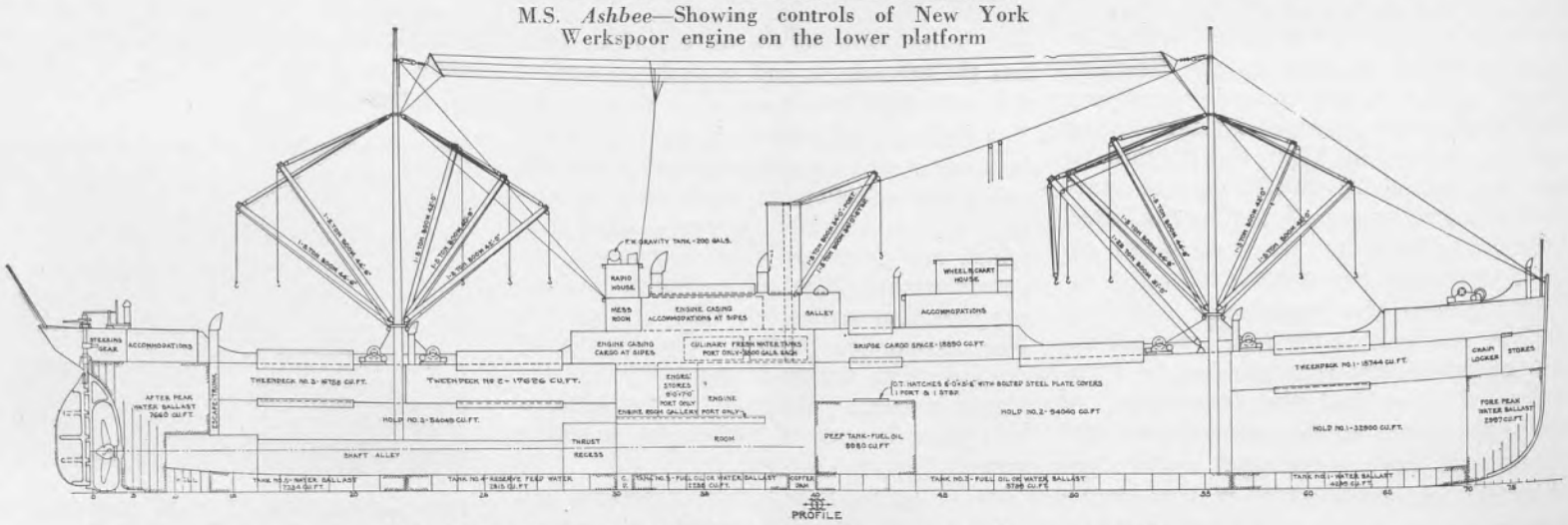
When the work of conversion was taken in hand it was found that there was a lot to be done around the ship apart from the replacement of the machinery. This is a point which must be borne in mind when any laid-up hull is purchased for a similar purpose. There was nothing wrong with the hull itself, but a certain amount of amateurish workmanship was found which needed overhauling. This appeared in such details as the derricks, the steam lines to the winches, the heating arrangements, crew's accommodation, etc. The cost of remedying these deficiencies has to be added to the price of the machinery conversion.



M.S. *Ashbee*—Showing controls of New York Werkspoor engine on the lower platform

In the MOTORSHIP of April, 1923, a detailed description was given of the 6-cylinder New York-Werkspoor engine of 2,000 i.h.p. which was constructed for the ASHBEE. A similar engine has been built for another vessel named the JACKSONVILLE, now being converted at the same yard. This engine, which has six cylinders of 27 in. diameter and 47 in. stroke, develops its power at 110 r.p.m. and replaces the boiler and geared-turbine machinery originally installed in the ship. No attempt was made to save any machinery space. The Diesel engine fits into the same length as was formerly given over to boilers and turbine. This has left a lot of room for the auxiliary engine-room equipment. A donkey-boiler has been retained for the operation of the deck winches, and for certain steam auxiliaries which it was deemed economical to keep in the engine room, for the reduction of the capital cost of conversion.

The new auxiliaries are electrically operated, power being provided by three Worthington oil engines direct-connected to General Electric generators. The aux-



M.S. *Ashbee*—Sectional profile showing machinery space and cargo capacities

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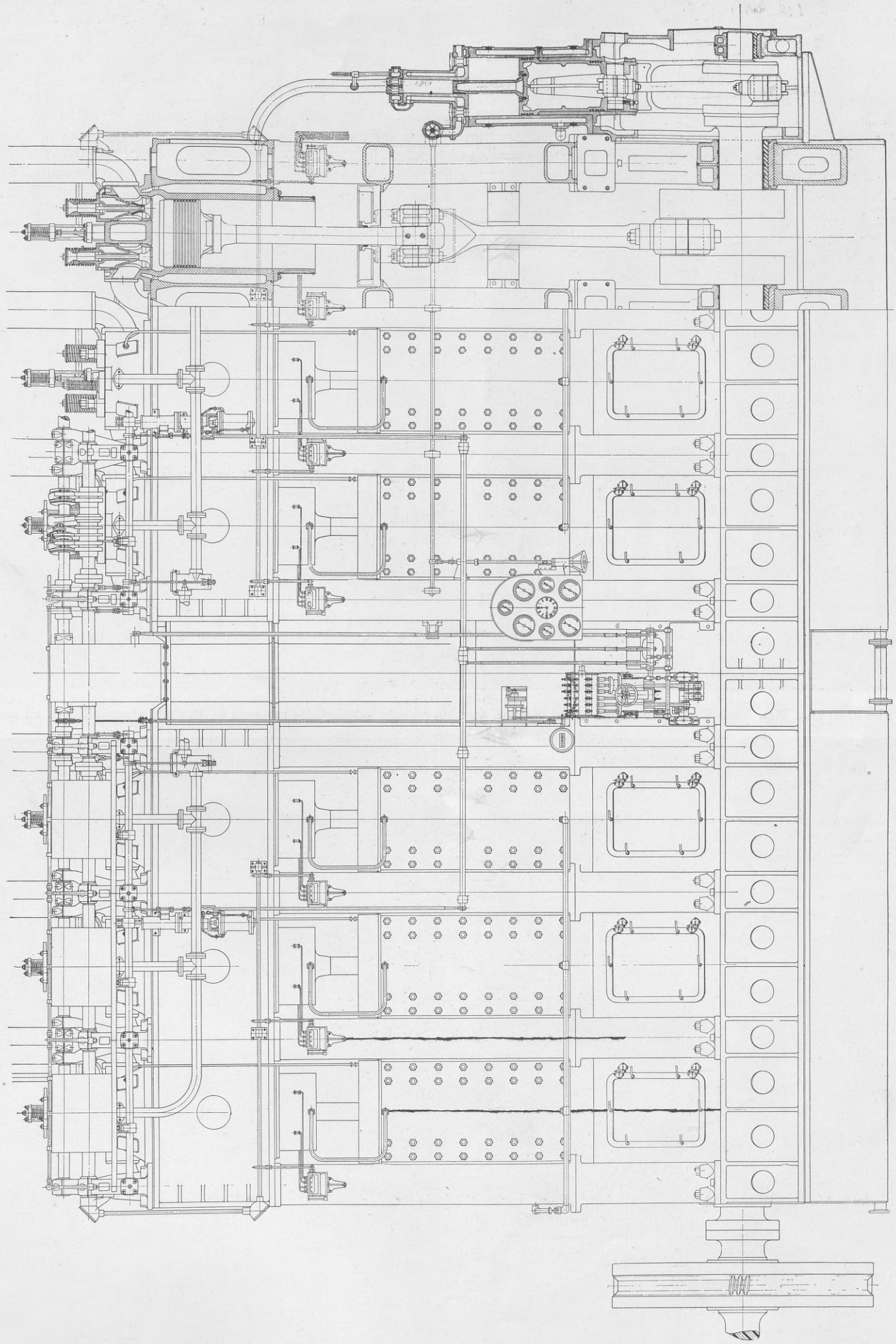

M.S. *Ashbee*—General arrangement drawings of her 2,000 i.h.p. New York-Werkspoor Diesel engine. This is an American modification of the Holland Werkspoor design

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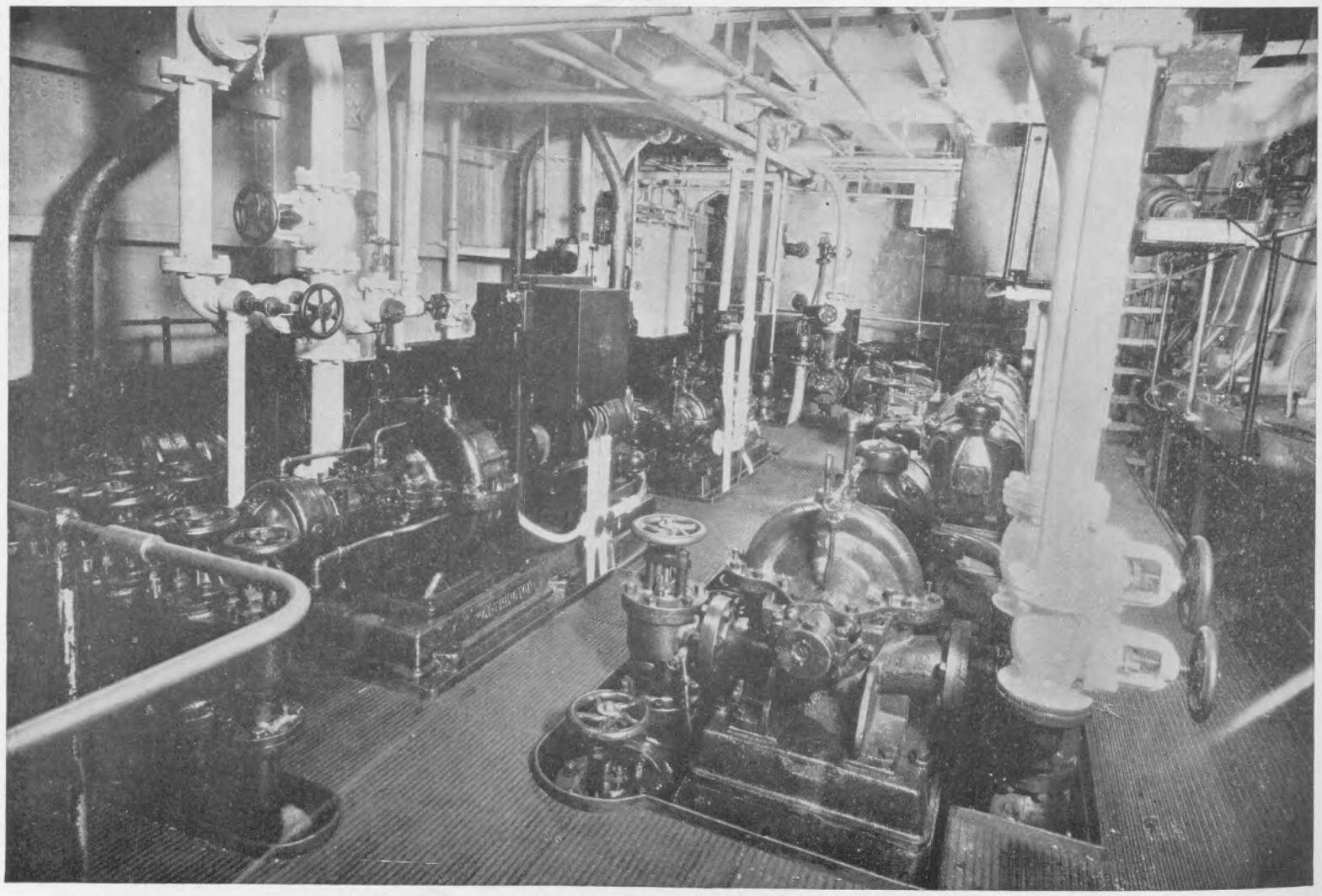
View of the 2,000 i.h.p. New York-Werkspoor engine of the *Ashbee* showing oil-tight splash-plates removed to illustrate accessibility of all parts



M.S. *Ashbee*—Port side of the engine-room showing the various pumps

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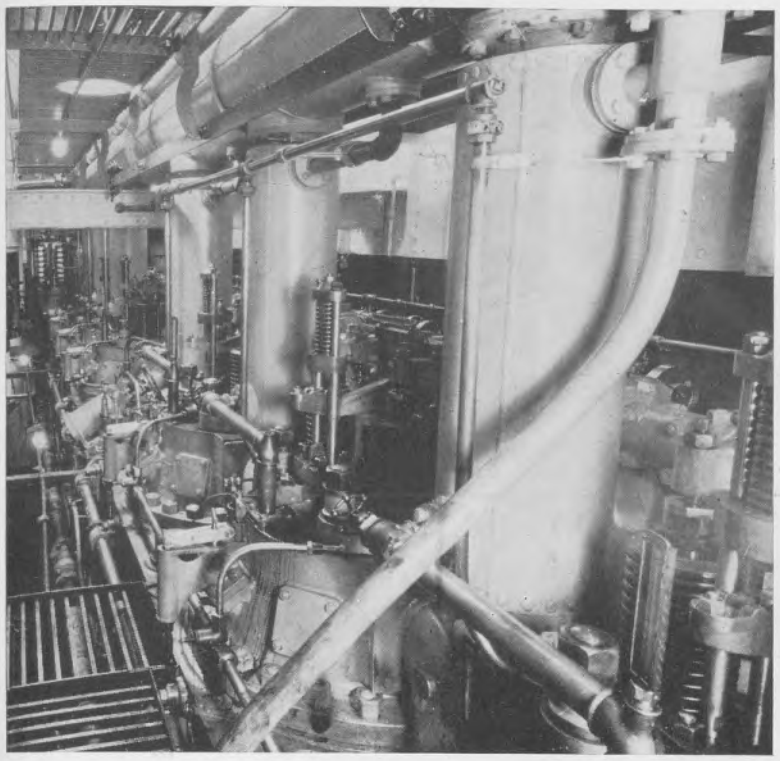
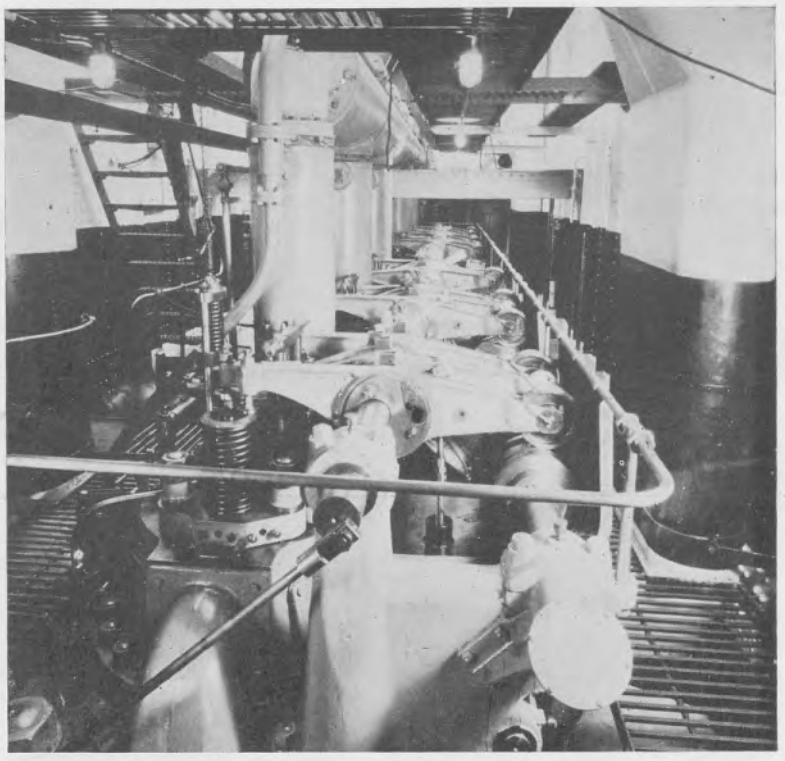


M.S. *Ashbee*—Showing cylinder-head construction and off-set fuel valve



M.S. *Ashbee*—View of the cylinder tops showing eccentric valve reversing mechanism

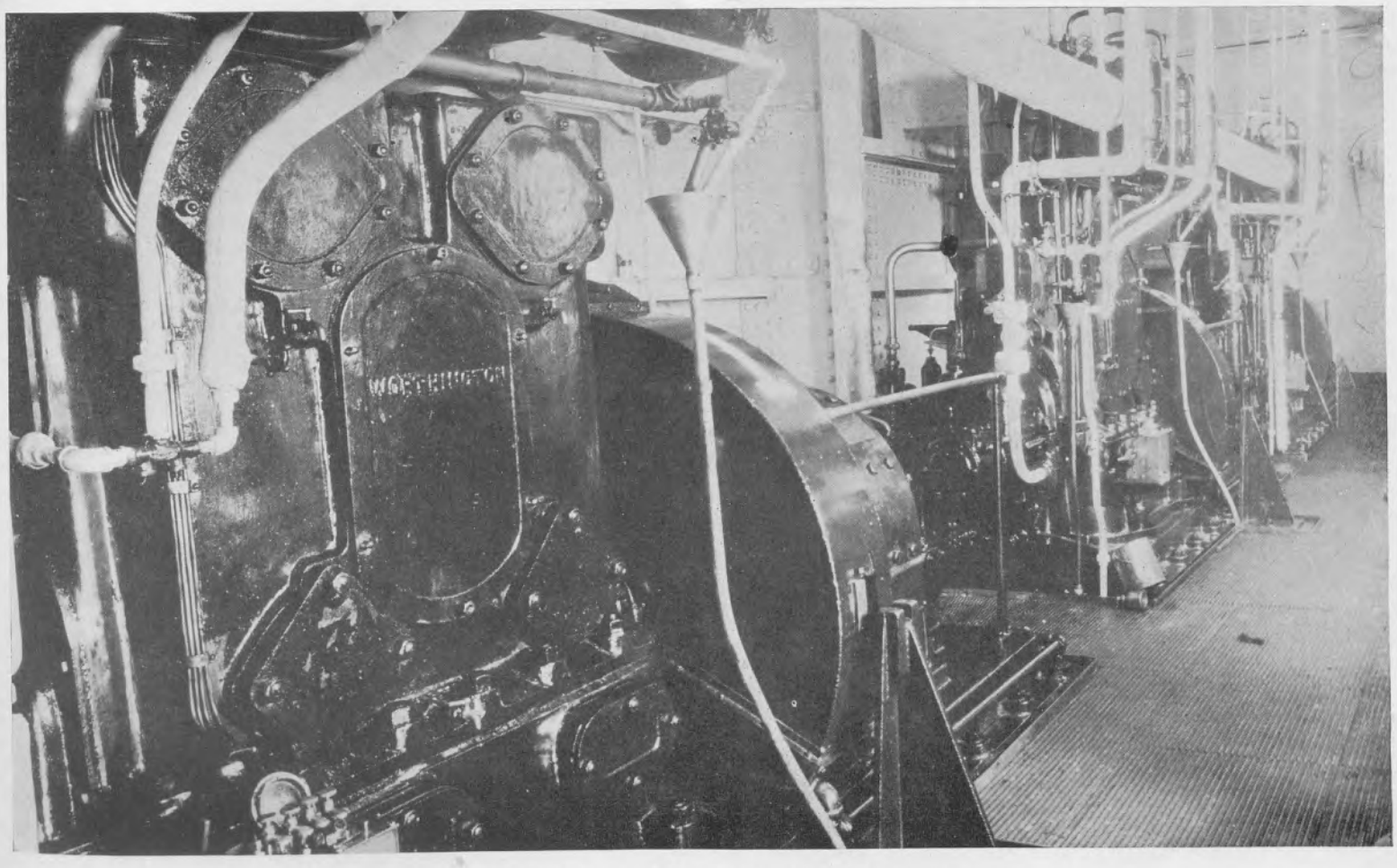
iliary compressor set consists of a two-crank, three-stage Worthington compressor driven by a General Electric motor. All the various pumps and electric motors driving them are respectively of the Worthington and General Electric type, with the exception of the fuel oil transfer pumps, which are Blackmer rotaries.

The weight of the main engine is 268 tons and the total engine room weights, including all auxiliaries, amounts to 428 tons.

Towards the end of last month the vessel was sent to sea on trial and with an actual displacement of 4,340 tons made a speed of 11.1 knots when developing her rated horsepower. It is understood that pending her sale, the ship will be operated by W. R. Grace & Co. of New York.

Length overall	346 ft. 6 in.
Length b.p.	334 ft. 6 in.
Breadth, moulded	48 ft. 6 in.
Depth, moulded	27 ft. 6 in.
Draft, loaded, mean	22 ft. 6 in.
Displacement, loaded	8,125 tons
Displacement, light	2,593 tons
Deadweight capacity	5,532 tons
Deep tank, fuel oil capacity	440 tons
Bunkers, fuel oil capacity	399 tons
Cruising radius	26,000 miles
Indicated horsepower	2,000 i.h.p.
Shaft horsepower	1,500 s.h.p.
Engine speed	110 r.p.m.
Cylinder diameter	27 in.
Piston stroke	47 in.
Daily fuel consumption (est.)	56 bbls.

CARISSO is the new name for the MAGUNKOOK, which is being converted from steamer to Werkspoor Diesel power by Moore Shipbuilding Co., Oakland, Cal. The Oceanic Steamship Co., which owns the vessel, names all its ships after geographic points in California. CARISSO is the name of a gorge near San Diego.



M.S. *Ashbee*—The Worthington oil-engine driven compressors

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The oil-engined tug *Hustler* on the Delaware

Philadelphia Starts to Modernize Tug Fleet

New Steel Towboat with 300 H.P. Oil Engine Goes Into Commission on Delaware River

TOWBOAT owners have been a hard group to convince of the practicability of the oil engine for their work, though perhaps they are no more conservative in this respect than some owners of other types of vessels. However, they seemed to have an additional argument over the others in contending that the oil engine was not flexible enough for a tug, that its minimum revolutions were too high, and that it could not be backed or handled or started up slowly enough to compete with the steam engine, even though its economy might be admitted.

The HUSTLER is an answer to any who may still cling to these arguments, and they are at liberty at any time to watch her bring three barges up the Delaware River against the tide and dock them, each barge being over 200 ft. long and loaded with 800 or 900 tons of sand. Her owners have been operators of steam tugs for many years, and they have stated that she pulls and backs and handles in general as well as any steam tug they have ever seen and a lot better than some.

The boat has been in continuous service since the last week in August, averaging at least 16 hours per day, and her performance has been so highly satisfactory that the owners have determined to eliminate steam tugs from their fleet as soon as possible.

The fuel consumption is averaging from 15 to 16 gal. per hour loaded (towing two or three barges), and about 10 gal. per hour light, the latter figure being due to the fact that the full power of the engine is not used when running at its rated r.p.m. with the vessel light. The full load fuel consumption works out at approximately 0.4 lb. per b.h.p. hour, which is 0.03 lb. better than the engine maker's guarantee. The fuel used is Mexican distillate, running 28 to 34 degrees Beaumé and costs around 4½c. per gal. One bunkering of 37 tons last about 40 days, assuming full load consumption at 16 hours per day. This makes a fuel cost of 72c. per hour maximum for the main engine.

The lubricating-oil consumption runs about 1 gal. for 4,000 h.p.-hrs. for the main engine, or 1.16 gal. per 16-hour day. This is a remarkably low figure considering the very thorough manner in which the engine is lubricated and is an unimportant factor in the total operating cost.

HUSTLER was designed by Edward A. Edwards, Philadelphia naval architect, for the Diamond P. Transportation Co. of the same city and was completed the latter part of August at the yard of the Clinton Shipbuilding and Repair Co. of Philadelphia.

She was designed for general inland and coastwise towing, her principal work being the moving of from one to three 800-ton d.w. sand barges up and down the length of Delaware Bay, with occasional outside trips to New York and New England points. The owners decided that 300 h.p. was the minimum for efficiently performing this work, and therefore the dimensions of the hull were made to accommodate an oil engine of that size, together with the necessary auxiliaries and a bunker capacity to give at least a month's supply of fuel. The draft was made about two feet less than would ordinarily be desirable, especially for strictly sea-going work, but it is necessary for the vessel to reach certain Bay and River points where the depth of water is limited and also navigate the canals at times.

One important advantage gained over the average steam tug of this size and power is the possibility of placing the main towing bitt nearly one-third of the vessel's length forward of the stern, a feature which greatly facilitates handling and steering with a heavy tow behind.

The construction is somewhat heavier than would actually be required by the American Bureau of Shipping or Lloyds' for a steel vessel of this size, as it has been found that strict adherence to classification society rules make a hull too light for the rough work usually encountered by the average towboat.

The principal measurements of the HUSTLER are:

Length o. a	82 ft. 6 in.
Length l. w. l	76 ft. 0 in.
Breadth l. w. l	19 ft. 9 in.
Depth, mean moulded	9 ft. 0 in.
Draft, mean	6.9 ft.
Displacement at 6.9′ draft	159.6 tons
Block coefficient	0.538
Midsection coefficient	0.798
Prismatic coefficient	0.674
Power	300 b.h.p.

This engine, manufactured by the Ingersoll-Rand Co., is a four-cycle, moderate compression type with airless injection,

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using the Price combustion head system of opposed sprays. It is a six-cylinder machine, with 13-in bore and 19-in. stroke, and is rated 320 b.h.p. at 250 r.p.m. The method of reversing is unique and not found on any other engine. The timing of the exhaust and inlet valves and the fuel injection are symmetrical with respect to the top dead center, so that the engine will run equally well in either direction without any mechanical changes whatever. It is simply necessary to start it ahead or astern as desired. There is a manifold on each side and two exhaust (or inlet) pipes. When running ahead one set of valves and one manifold with its pipe carry out the exhaust gases while the other acts as air intake. When running astern the functions of the valves, manifolds and pipes are reversed, those previously acting as intake becoming exhaust, and vice versa. This system works perfectly, due to the clean combustion of the fuel, adds no extra parts and enables the entire control and reversing of the engine to be centered in a single lever. It also is adapted to a simple arrangement of duplicate control station above the engine room grating.

Lubrication is especially thorough and is a combination of pressure feed, gravity feed and splash systems, the important bearing receiving oil by all three methods. There are two lubricating oil pumps operated from the crank shaft extension at the forward end of the engine, one maintaining the pressure feed circulation and the other caring for the gravity feed through a Richardson-Phoenix filter located on the upper engine room grating. The oil from the cylinder walls, which encounters the worst conditions as to heat, carbon, etc., is not returned to the crank case and recirculated with the general system, but is drawn off separately into a small tank and may be thrown out from time to time instead of being put through the filter, fresh oil being put in to replace that discarded.

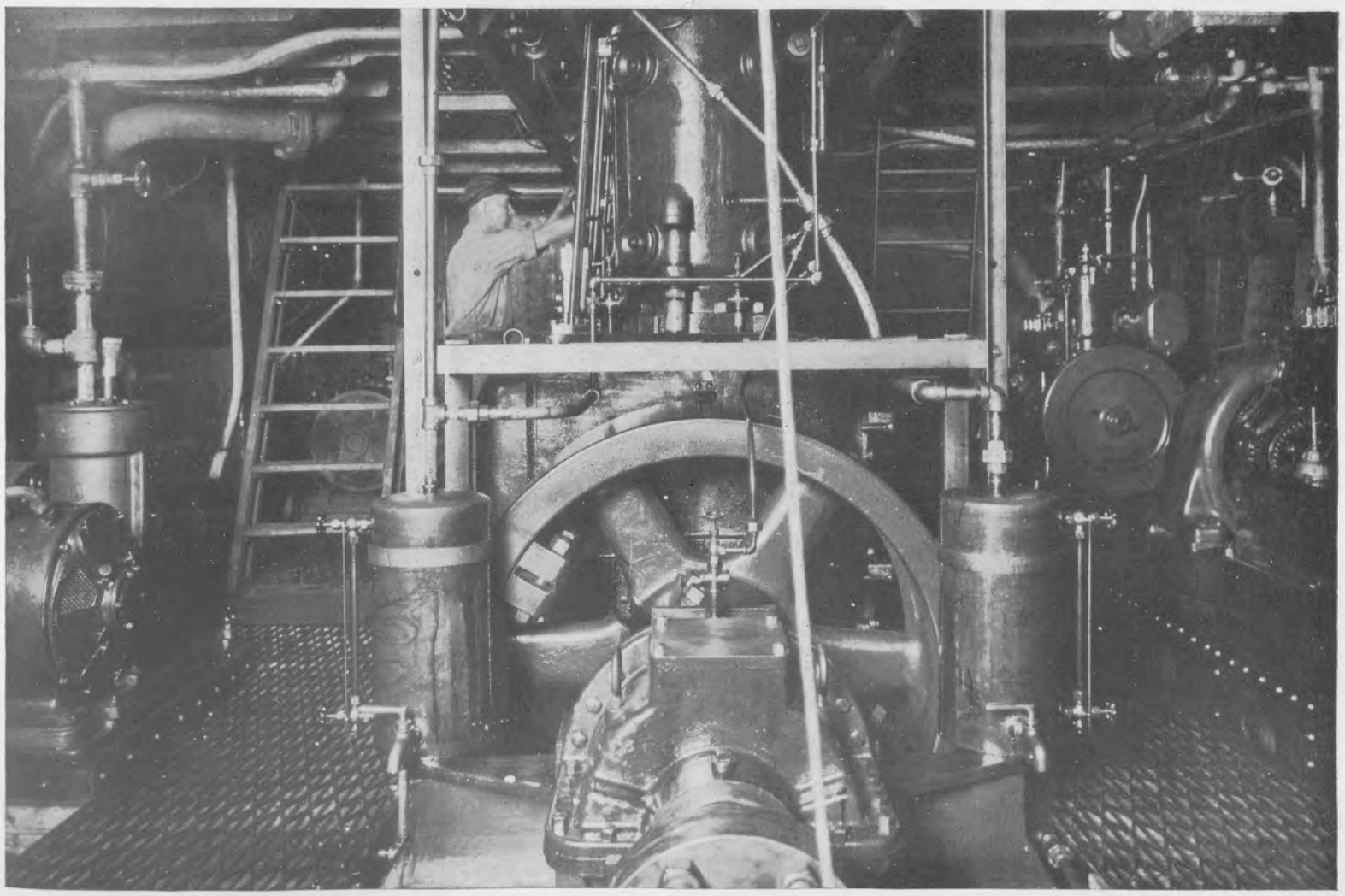
The engine has two main fuel pumps, each supplying a group of three cylinders through a distributor. The valve gear is very quiet in operation, the push rods being operated by eccentrics on the side shaft located inside the crank case housing, and the valves themselves, instead of having the usual rocker arms, are actuated by a roller path motion which gives them a uniformly accelerated opening with the greatest leverage on the rocker at the moment of opening against the terminal pressure, thus causing a minimum stress on push rods and side shaft. The inlet and exhaust valves are interchangeable and housed in removable cages so that they are easily and quickly accessible without removing cylinder heads.

At the forward end of the engine are placed a 6″x6″ air compressor, for furnishing starting and maneuvering air at 200 to 250 lbs. pressure, and two water pumps, either of which may be used for jacket circulation or general service while the engine is running.

For the auxiliary generating sets it was at first planned to use gasoline engine driven units, but it was finally decided to use one of the only types of oil engine available which would operate on the same fuel as the main engine. The two sets installed consist of 8 h.p. single-cylinder Mianus oil engines, direct connected to 5 k.w. General Electric 110-v. direct current generators. One set is of sufficient size to operate any of the auxiliaries under all ordinary conditions, and the two are arranged for parallel operation, if necessary in an emergency which might require the fire pump at its full capacity. The Mianus engine uses the well-known Leissner system of fuel injection and shows a fuel consumption of around 0.5 lb. per b.h.p.-hr. This means a fuel cost of only about 2⅓c. per hour, as against 15c. per hour, which would be required to run a gasoline set.

The auxiliary air compressor is a 4½″x5″ Ingersoll-Rand machine, hopper cooled and connected by a short belt drive with idler pulley to a 7½ h.p. 110-v. Diehl ball-bearing motor of the enclosed and ventilated marine type. The motor speed is 1150 r.p.m. and that of the compressor 450 r.p.m.

The only power-operated deck machinery is an Allan Cunningham electric capstan located alongside the after towing bitt and used for handling lines. It is of the combination hand and power type, with a back gear, giving double power at half speed when reversed. The motor is a 5 h.p. 110-v. Diehl semi-enclosed type, turning at 720 r.p.m. It is hung from the under side of the deck and drives the capstan through a worm gear.



Looking forward in the engine-room of the motor tug *Hustler*, showing the Ingersoll-Rand oil-engine which drives the boat

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American Motorship SUPHENCO Completes Maiden Voyage

BECAUSE the engine was installed in the hull before completion there was no opportunity to carry out any shop testing, consequently, it was decided to send the SUPHENCO on her maiden round voyage of 5,000 miles, from New York to the Gulf ports, prior to releasing any information regarding her new Craig 2,240 i.h.p. single-screw Diesel engine. The SUPHENCO having finished the first trip in excellent shape, we were invited by the Transmarine Line to inspect her at its deep water terminal in Port Newark, N. J., in order that we could broadcast the details of the design to our readers all over the country. Her average speed on the voyage was a little over 10 knots, no attempt having been made to force the engines to run continuously at full load, although as high as 2,338 i.h.p. was reached at 96 r.p.m. The designed output of the engine at full load is 2,240 i.h.p. (1,850 shaft h.p.) at 105 r.p.m., although its broad rating is given as 2,000 i.h.p. at 100 r.p.m.

No trouble was met from the engine, which ran excellently and with complete freedom from vibration, although as may be expected, there was found to be room for a number of minor adjustments and modifications, which will gradually be carried out each time the vessel is in port loading and unloading. None of these are of sufficient importance to impair the running of the machinery, but simply that better results will be secured after they are made. For instance, the 14 in. exhaust pipe ran into an 8 in. pipe connected to the muffler, and the slots on the end of the pipe in the muffler were too narrow. So the pipe has been changed to one of 14 in. throughout, and the slots

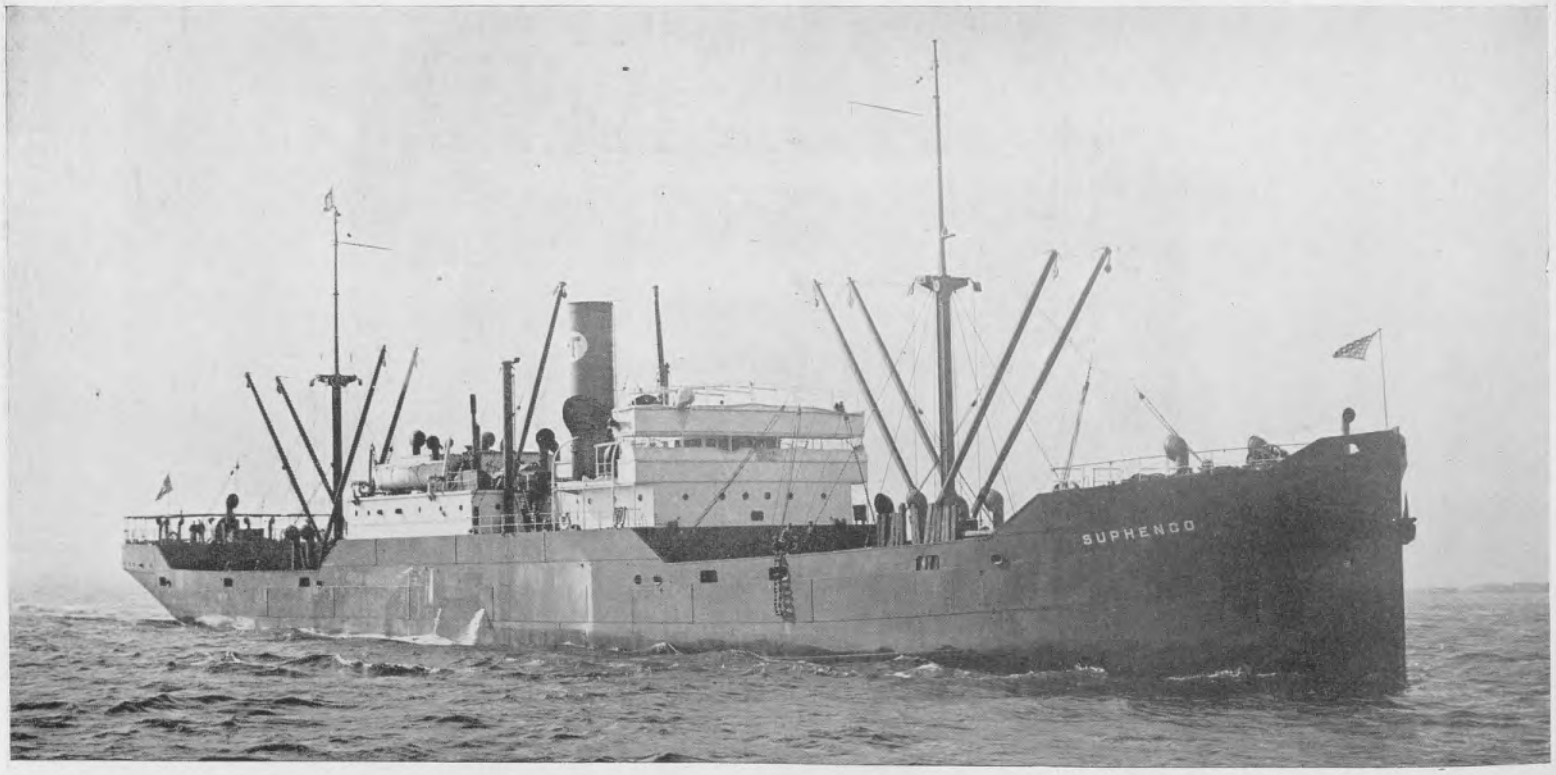
Installation of the First Big Craig Diesel Engine

enlarged, thus eliminating the back pressure that previously resulted. This and the other little things are not serious from an engineering aspect, but are merely things that are always noticed by experience under operating conditions with new designs.

Henry R. Sutphen, Vice-President of the Submarine Boat Corporation, whose enterprise and foresight was largely responsible for the construction of the motorship *Suphenco* and the development of the Craig engine

Before dealing further with this craft and her interesting engine, a reference to the story of the development is not out of place. The Submarine Boat Corporation, as we all know, opened the Newark Bay Shipyard as a war measure for the fabrication of steel cargo ships, and a total of 150 standardized steamers of 5,350 d.w. tons were turned out in record time. Just as the yard was in full swing delivering a complete geared-turbine vessel every three days, the great war stopped. As with other great yards a readjustment was necessary. Transatlantic shipping remained in good shape for over a year, so the Submarine Boat Corporation decided to finish the last 32 hulls to their own account, and incidentally relieve the Government of unwanted ships. No slump was then anticipated, but looking to the future the Corporation decided to develop a Diesel engine of a type ideal for quantity production and fabrication, and thus reduce manufacturing costs to a great degree. The first Diesel engine was to be installed in the 150th hull, although the complete steam machinery on hand would have to be discarded. This hull was the SUPHENCO, named after Henry R. Sutphen, vice-president, who has fostered the big Craig Diesel proposition from its inception, and to whom, in our opinion, a great deal of credit must be given.

It was Mr. Sutphen's opinion that the methods pursued by most European builders, particularly the Germans and Scandinavians, have resulted in the production of massive units, with many in-



Single-screw 5,350 ton d.w. motorship *Suphenco* of the Transmarine Line, New York. She is propelled by a Craig four-cycle type Diesel engine, 2,000 to 2,240 i.h.p.

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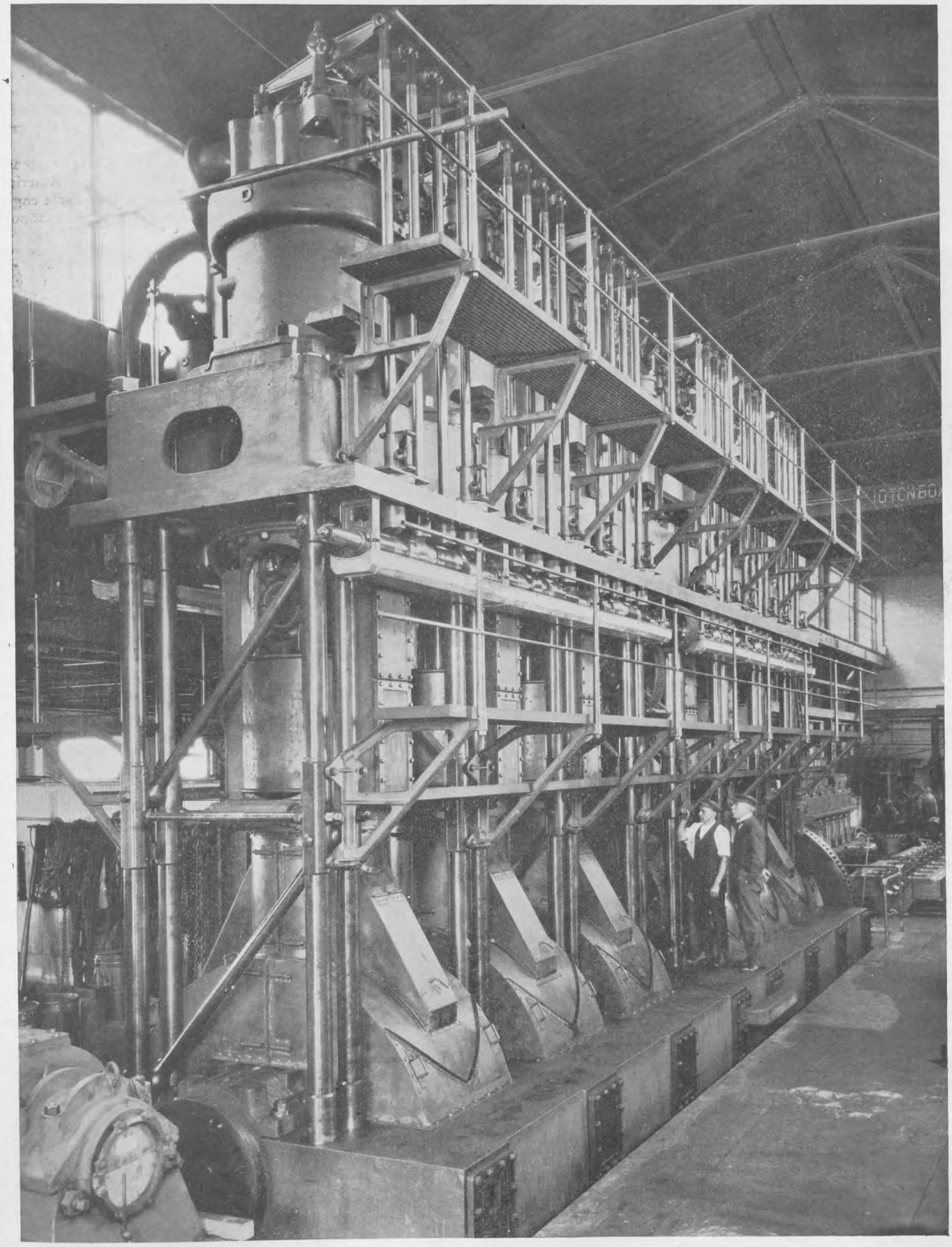
accessible parts, huge castings, and with myriads of small and dissimilar items. An immediate objection to this policy is the difficulty of replacing broken parts.

With broad, but definite principles of standardization in mind, James Craig, of James Craig Engine Works, of Jersey City, an engine builder already experienced with the construction of Diesel engines and air compressors, and who held similar views, was commissioned to design and build a 2,000 h.p. single-screw set. The engine required two years to construct, and is an unusual piece of mechanical craftsmanship. It was built part by part, and erected within the Craig shops at Jersey City. After it was almost completed it was taken apart and shipped



The Craig 2,240 i.h.p. four-cycle type Diesel engines of the m.s. *Suphenco*

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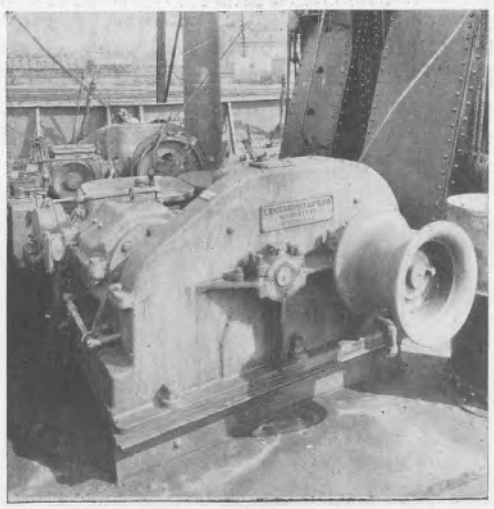
piecemeal to the Newark Bay Shipyard, at Port Newark, for final assembling in the SUPHENCO. One of the unusual features in this design permits the engine to be assembled as a right or left hand engine without special machinery or fitting.

By reason of its design it very probably could be turned out at lower cost than any other Diesel of its power if produced in quantities, as every feature was laid-out with this object in view. Its specifications are as follows:

Indicated horsepower	2,240
Shaft horsepower	1,850
No. of cylinders	6
Cylinder diameter	30″
Piston stroke	48″
Revs. per minute	105
Piston speed, per min	840
Ind. h.p. per cyl	375
Brake h.p. per cyl	310
Weight, short tons	275
Weight per b.h.p	300 lbs.
Mean effec. pressure	68½ lbs.
Length overall	41 ft.



M.S. *Suphenco*—Another view of one of the Lidgerwood electric-winches

sufficiently oil-tight. Furthermore, another part of the design which may lend itself to engineering comment is the absence of liners for the cylinders, which are of 30 in. diameter by 48 in. piston stroke. This is quite a radical departure, but if Craig's theories on the question turn out to be correct, it may lead other builders to modify their ideas, in which case the cost of manufacture would be considerably reduced. One voyage is not sufficient to judge, but if a test of about two years' operation is successfully withstood, it will be a "feather in the cap" for James Craig.

Just at the time that Craig started to construct this engine, another American company built a marine four-cycle engine of similar power with lower exhaust ports but with automatic control valves, whereas in the Craig engine there are lower exhaust ports but with mechanically operated valves. We understand that on her maiden voyage this exhaust port system worked out excellently and maintained the cylinder heads in a very cool condition. This lower exhaust port, of course, is fitted as an auxiliary to the main exhaust valve in the cylinder head, with the purpose of clearing the cylinder of the hottest part of the burnt products of combustion so that the full pressure of the heated exhaust does not pass the exhaust valve.

Another departure from American Diesel practice, but which has been tried out with reasonable success by one or two European builders, is the elimination of the customary air-compressor on the main crankshaft, although fuel injection is carried out by blast air. It undoubtedly adds a little to the engine-room crew's work of handling the main engines—particularly when maneuvering. To our mind there are other advantages obtained which outweigh this point, and which should not take long for the operators to get accustomed to maintaining the speed and output of the auxiliary engine-driven

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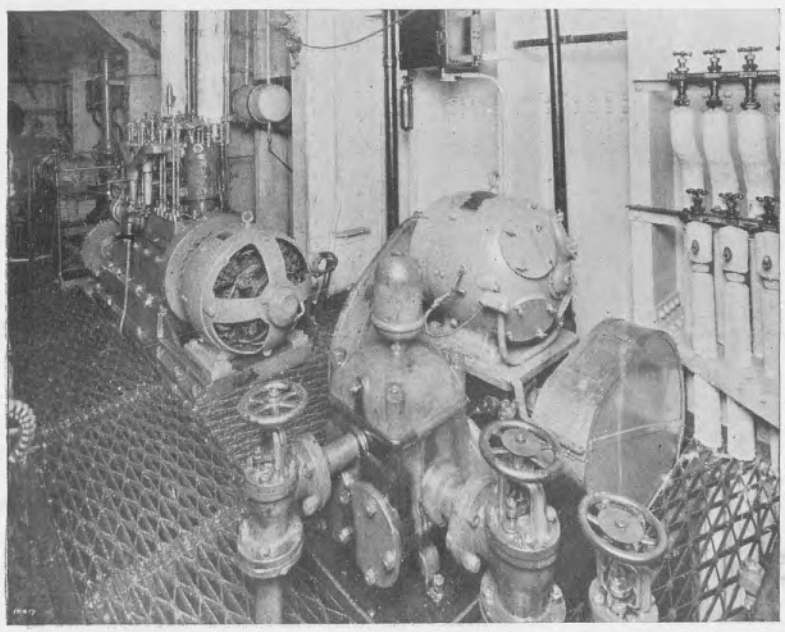
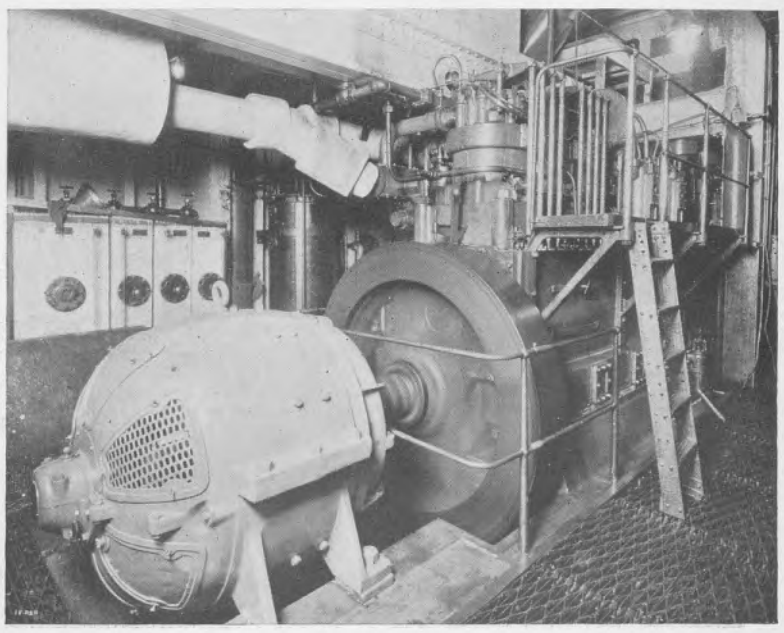


M.S. *Suphenco*—Showing in the background the Craig gasolene burning emergency air-compressing and lighting set



M.S. *Suphenco*—Craig 4-cylinder, 240 h.p. auxiliary air-compressing and generating set on the port side of the engine-room

It is an American production throughout, no foreign constructional licenses or European Diesel designers having been secured. In fact, one may say it was a "one-man job," constructed in a small shop in Jersey City, where about 20 men are employed. James Craig has practically designed the engine himself, including making many of the drawings, and working in the shops personally supervising the machining and assembling.

Possibly the critical can find a number of features in the design that could be improved, but the same may be said of any new engine. Being the first of its type, it is not perfect in all minor details, and upon our inspection we noticed a number of small things that could be modified. For instance, the lubrication of the main bearings is by a sight-drip feed, whereas the consensus of marine engineering opinion is that forced lubrication is just as necessary for the main bearings as for the cylinder walls. Then again the sheet-metal work enclosing the crankcase may be considered a little too flimsy and not

Mr. H. R. Sutphen and Chief-Engineer O. B. H. Hansen discuss the maiden voyage of the *Suphenco*

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(*Continued from page 784*)

air-compressor to synchronize with the speed of the main engine. In the first place at least 5 ft. to 6 ft. are saved in the length of the engine, affording a shorter engine-room and allowing more cargo to be carried.

In this particular ship there is no actual saving in engine-room space, because the original engine-room designed for steam has been used, and this is 47 ft. 3 in. long. Nevertheless, had the air-compressor been installed, it is possible that the bulkhead would have to be moved because the main engine is 41 ft. long over all. Consequently, full power of the engine is given to the propeller shaft instead of the usual 10 per cent. being absorbed by the compressor. The total power of the ship is not added to, for auxiliary engine power sufficient for the main compressors is also needed for driving the generators to work the ship's winches when in port, during which time the main engine is not running. But we personally think that the elimination of the main compressor probably would be personally think that the elimination of the main compressors probably would be more advantageous on a twin-screw ship than on a single-screw ship, as then two large auxiliary compressors could be installed, both of sufficient capacity for the twin main engines—using one at sea and the other as a standby, the same auxiliary engines also being used for driving the generators. In fact, the compressors themselves could be electrically-driven. These, however, are all questions largely depending upon the vessel herself, her type and trade route.

On the SUPHENCO it has been found that the injection air supplied by one of the auxiliary engine-driven main compressors was of ample capacity at all times, even under the severe conditions of moving ahead and astern when entering port. Consequently, no tug service was necessary handling the ship in and out of her berths, although a single-screw vessel.

With the exception of the Falk oil engine, no American marine Diesel has been constructed with the controls on the upper platform, although there are some European motorships thus arranged. The upper platform control has been incorporated by Craig in his design. This enables the operator to keep an eye on the fuel valves and general valve operation.

The camshaft driving gears are between the two sets of three cylinders under the operating platform, enabling any dismantling to be done without much trouble. On the camshaft there are two sets of cams, one for ahead and the other set for astern. To reverse the engine the camshaft is moved in the fore and aft direction bringing the astern set of cams under the rollers of the valve rockers.

It will be noted that the engine is of the open-frame and steel column type with separately cast cylinders, the latter being mounted on a cast-iron entablature. The steel columns run from this entablature on to a heavy cast-iron bedplate. Diagonals are mounted between the columns to prevent lateral sway. It will be noted that the columns are arranged in pairs, and with alternate sets of columns the diagonals run in opposite directions. Under the bedplate the usual structural steel engine beds have been substituted by cast-steel sub-bases, weighing between 62 and 63 tons. The cylinder entablatures together weigh 30 tons, each cylinder weighs 5 tons and the flywheel weighs 15 tons. We understand that the total weight of the engine is 275 tons or 300 lbs. per shaft h.p., without including the auxiliary engines. Fuel consumption of this engine on her maiden voyage was 4½ tons of fuel oil per day, which gives this vessel a tremendous advantage over her sister steam-driven vessels, as they consume 18 tons a day. However, when the SUPHENCO is running at full load, as will be done on the second voyage, the consumption will probably increase to between 5 and 6 tons.

It is our intention to limit the description of the engine in this article with a view to publishing a more detailed story in an early issue. We will now give some details of the hull and equipment. Her main specifications are as follows:

Name of ship	SUPHENCO
Displacement, loaded	7,615 tons
Cu. capac'y of holds of 'tween decks	226,150 cu. ft.
Cu. capacity of deep tank, for cargo	11,300 cu. ft.
Total cubic capacity	237,450
Capacity, total bottom bunkers	301,970 gals. (1,078.46 tons)
Cruising radius	38,000 nau. miles
Fresh-water capacity	30 tons
Horsepower, shaft	1,850
Horsepower, indicated	2,240
Engine speed, r.p.m.	105
Ship's speed, loaded	10½ knots
Propeller, dia. pitch and area	14'6"x12'x56.6 sq. ft.
Launched	April 12, 1921
Put in service	Sept. 6, 1923
Length of engine-room	47' 3"
Daily fuel-consumption	5 to 6 tons
Engine-room staff	14 men
Type of engine	Craig single-acting, four-cycle
Cylinder bore and piston stroke	6 cylds., 30"x48"
Length of ship	335' 6"
Breadth	46' 0"
Depth	28' 6"
Draft, loaded	23' 0"
Block co-efficient	0.772
Classification	Amer. Bureau A1 and Lloyds 100A1
Builders of ship	Submarine Boat Corp.
Operators	Transmarine Line

In the case of the sister steamships, the deep tank, which has a capacity of 394 tons, has to be used for bunkers on the outward journey and for cargo on the return voyage, whereas with the SUPHENCO the deep tank is never used for fuel, her double bottom capacity being sufficient for 38,000 miles. If the sister steamers were proceeding on long distance voyages instead of trading in the coastwise service, it would be necessary to use the deep tank for fuel at all times. This is only one point in favor of Diesel power.

The engine-room staff consists of 14 men, whereas in the sister steamer only 13 men are needed. We presume that this is some existing rule of the American Navigation Laws, because European motorships of similar tonnage and power have only 7 men in the engine-room.

(*To be concluded in December*)

Loss of M.S. Kennecott

One of the most reliable motorships ever built in any country has become a total loss after running on the rocks during thick weather in the North Pacific. The motorship in question is the KENNECOTT, owned by the Alaska Steamship Co., which ran aground in Kano Inlet, inside Hunters Point, at the southwest corner of Graham Island, B. C. At the time the wreck occurred there was a strong S. W. gale blowing and the night was very dark, with some fog. Under such conditions there is a strong set of the tide towards the coast, and this has been responsible for a good many wrecks on the west coast of Queen Charlotte Island and Vancouver Island. The KENNECOTT was bound from Kobe, Japan, to Seattle, via Latouche and Cordova, Alaska, with 6,000 tons of copper ore aboard. Her value was approximately $1,000,000, while the cargo was reported to have had a value of around $2,000,000.

Where she ran ashore she was exposed broadside to the sweep of the Pacific and was practically doomed from the start. The master, Capt. J. A. Johnson, put his crew off as soon as possible, and, when he could no longer stay aboard with the eight willing helpers who stood by him, established a camp on Graham Island to guard the vessel until the underwriters could officially take charge. When Lloyd's surveyor reached the scene of the wreck aboard the salvage steamer HERCULES, more than two weeks later, he reported first that the vessel was breaking up and then finally that she was destroyed. Captain Johnson laboring under a severe mental strain and greatly depressed over the loss of his ship, committed suicide in the Gulf of Georgia, October 21st. With him there passed a worthy man.

The KENNECOTT was a most successful vessel and showed a substantial profit on every trip she made. She was built in 1921 at the Tacoma plant of Todds Shipyards Corp. and was powered with twin McIntosh & Seymour Diesel engines. It is to be hoped that her owners will replace her with another Diesel ship.

Other big craft went ashore at the same time as the KENNECOTT, including the steamer REDONDO, owned by the same company, but which was afterwards floated. This also applied to the British steam tanker EL LOBO and the Japanese freighter BEARPORT.

THE STEADY GROWTH OF MOTORSHIPPING
(According to Lloyd's Register)

Lloyd's shipbuilding returns for the quarter ending Sept. 30th, 1923, show a reduction in the World's tonnage of ships under construction under date of June 30th. Motorships make a favorable showing in the face of the continued slump, as 460,863 gross tons are building or over 24% of the total shipbuilding tonnage, apart from a considerable number of conversions of steamers to Diesel power on hand. The total tonnage of ships of all types under construction is 2,052,000 gross tons, or less than two-thirds of the pre-war record; but in addition there are 325,000 tons of steamers partially built but on which work has been suspended.

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Notes on Orders Just Placed

Twenty large motorships are now building on the Clyde, totalling nearly 100,000 tons gross.

The Götaverken's new dock at Göteborg has a capacity of 18,000 tons and a length of 600 ft. by 85 ft. breadth.

Two small Diesel-driven motorships are about to be purchased by the Construction Materials Co., 40 Rector Street, New York.

A 35-ft. stern wheeler propelled by a Diesel engine may shortly be built by O. B. Gerle, a mining engineer of Silver Valley, B. C.

An Ingersoll-Rand oil-engine of 300 h.p. has been ordered by the Diamond P. Transportation Co. for installation in a tug, the same being a repeat order of the tug HUSTLER.

M. B. Bryan, of Norfolk, is planning a tug-boat in which he will install a 200 b.h.p. Diesel-engine driving a propeller through reduction gears, the engine running at 250 r.p.m. and the propeller at 200 r.p.m.

There was recently launched at the Long Beach plant of the Craig Shipbuilding Co., one of the largest Diesel-driven tugs on the Pacific Coast. She is of 92 ft. with a cruising radius of 3,000 miles.

Two 400 k.w. Diesel-driven G. E. generators are installed on the U. S. battleship WEST VIRGINIA just completed at Newport News. The Diesel engines are Busch-Sulzer.

A 60 b.h.p. Enterprise Diesel engine is being installed in the tug TWILIGHT at Herbert Madden's yard, Sausalito, to the order of the Peterson Launch & Tugboat Co.

Following a four months' trip through Europe studying Diesel engines, Mr. Rentschler and Henrik Gregor, of Hooven, Owens & Rentschler, of Hamilton, Ohio, recently returned to this country.

Between 1899 and 1915 Ludwig Nobel, of Petrograd, constructed Diesel engines to a total of 170,000 b.h.p. A new Nobel Diesel factory has been opened at Nynäshamn, Sweden.

In the steamer PYTHON now being converted to motor power for the O'Boyle Lighterage Co., the 850 shaft h.p. McIntosh & Seymour Diesel engine from the wooden tanker PENROSE is being installed.

Burmeister & Wain have just launched another motorship, the NORDBO, which entered the water on Oct. 4th. She is of 8,000 tons d.w. and is to the order of the Norden Steamship Co., Ltd., Copenhagen. Twin 1,300 i.h.p. B. & W. Diesels are being installed. Her length is 380 ft. by 53 ft. 6 in., breadth, and 36 ft. draft.

Two Diesel engines of 450 h.p. each have been built at the Royal Dockyard at Horten, Norway, for the first submarine designed and contsructed entirely by the engineering staff of the Norwegian Navy.

Four 225 b.h.p. Ingersoll-Rand oil-engines have been ordered by the Atlantic Refining Co., of Philadelphia, for installation in conjunction with General Electric drive in two tugs. The hulls have not yet been ordered.

Two small tank lighters are building for the American Petroleum Co., Rotterdam, in which Kromhout oil-engines of 20 and 15 b.h.p. are being installed respectively. The boats are being built at the Vooruit Yard, Enkhuizen.

The Liverpool *Journal of Commerce* reports that the Vulcan Co. has received an order for four Diesel engines of 2,000 shaft h.p. each for installation in a new quadruple-screw passenger motor-liner for German owners.

Witherbee Sherman & Company, of Port Henry, N. Y., are preparing to build a 300 ft. by 40 ft. by 8 ft. motor-vessel for the Gt. Lakes and N. Y. canal service, in which two 300 shaft h.p. Diesel engines will be installed.

MOBY DICK, the new motor yacht for F. H. Fish, has just been completed at the Harlem Plant of the Bethlehem Shipbldg. Corp., Wilmington, from designs by Henry Gielow. In this yacht a 180 b. h. p. Krupp Diesel engine is installed.

Two 50 ft. oil-engined fishing boats were recently launched at the yard of Herbert Madden, of Sausalito, Cal. In each craft a 45 b.h.p. Fairbanks-Morse engine is installed. They are for Smith Bros., Santa Rosa.

It is reported that a German oil-engine of new design will be built at the Kockum shipyard, Malmö, Sweden, under license, and installed in a 6,500 tons motorship being constructed at this plant for the Johnson Line of Stockholm.

Furness Withy's Doxford-built motorship DOMINION MILLER has just made another excellent voyage, namely from Swansea, Wales, to Los Angeles harbor, Cal. She averaged 11.25 knots on 7¼ tons of boiler-oil. Such economy and speed should drive home the advantages of oil-engine power to any skeptical shipowner.

The 14,000 tons displacement motorship for the Messageries Maritimes, referred to on page 710 of our October issue, has been ordered from the Chantiers de France. The make of Diesel engine has not yet been announced. As the vessel will be almost a sister ship to the steamer SPHINX, interesting operating comparisons should result later.

On Thursday and Friday, November 8 and 9, the American Marine Congress meets in New York to receive the reports of the various committees. A big dinner will be held on Thursday night. During the same week the American Society of Naval Architects & Marine Engineers holds its annual general meeting in New York, and a Marine Exposition will also be open at the Grand Central Palace.

A. P. Moller, of Copenhagen, has taken delivery of another motorship, namely the CHASTINE MAERSK, built at his Shipyard at Odense, the Diesel machinery having been supplied by Burmeister & Wain, of Copenhagen. The vessel is twin-screw and of 7,980 tons d.w., propelled by two 1,100 i.h.p. trunk-piston type Burmeister & Wain engines. This engine is one of the latest B. & W. designs. Full details and illustrations will appear in our December issue, having been crowded out of our November number owing to great pressure on space.

A new motor-tug of about 100 ft. length is to be built for the Marine Department of the Pennsylvania Railroad, for service in New York harbor towing car-floats. For propelling purposes two Winton Diesel engines of 375 brake h.p. at 250 r.p.m., direct connected to Westinghouse generators, have been ordered. These will furnish current to a Westinghouse propelling motor of 575 shaft h.p. Incidentally, the marine-superintendent of the Pennsylvania Railroad, who is responsible for this order, has for some years been a subscriber to MOTORSHIP.

One of the nine large Diesel-driven motorships recently ordered by Andrew Weir & Co., of Glasgow, from Harland & Wolff, Ltd., was launched at the builders' Goven shipyard on October 11th. She is a freighter for the Calcutta-South African service of the owners, and has first-class passenger accommodation for 12 passengers. There is also accommodation for 28 second-class native passengers. All accommodation on the ship, including for the officers, engineers and crew, is heated by Benham electro-vapor radiators, which device is now manufactured in this country under license by Walter Kidde & Co., 140 Cedar St., New York City. Her name is GUJARAT.

ALASKA STANDARD, the sister motor tanker to the STANDARD SERVICE, of the fleet of the Standard Oil Co., of Cal., was launched on October 6th at the Union Plant, San Francisco, of the Bethlehem Shipbuilding Corp. Like the STANDARD SERVICE she is propelled by Pacific-Werkspoor Diesel engines in conjunction with G. E. electric transmission. There are two main engines of 400 b.h.p. driving generators and furnishing power to a 600 shaft h.p. electric motor. When the STANDARD SERVICE was pressed into emergency service in Alaska delivering oil to shallow harbors and to canneries where there was no harbor at all, her light draft was found to be of great advantage. Consequently, the sister vessel was designed accordingly. The draft is 16 ft. 6 in., on a 40 ft. breadth and 210 ft. length, the capacity being 12,000 bbls. of oil.

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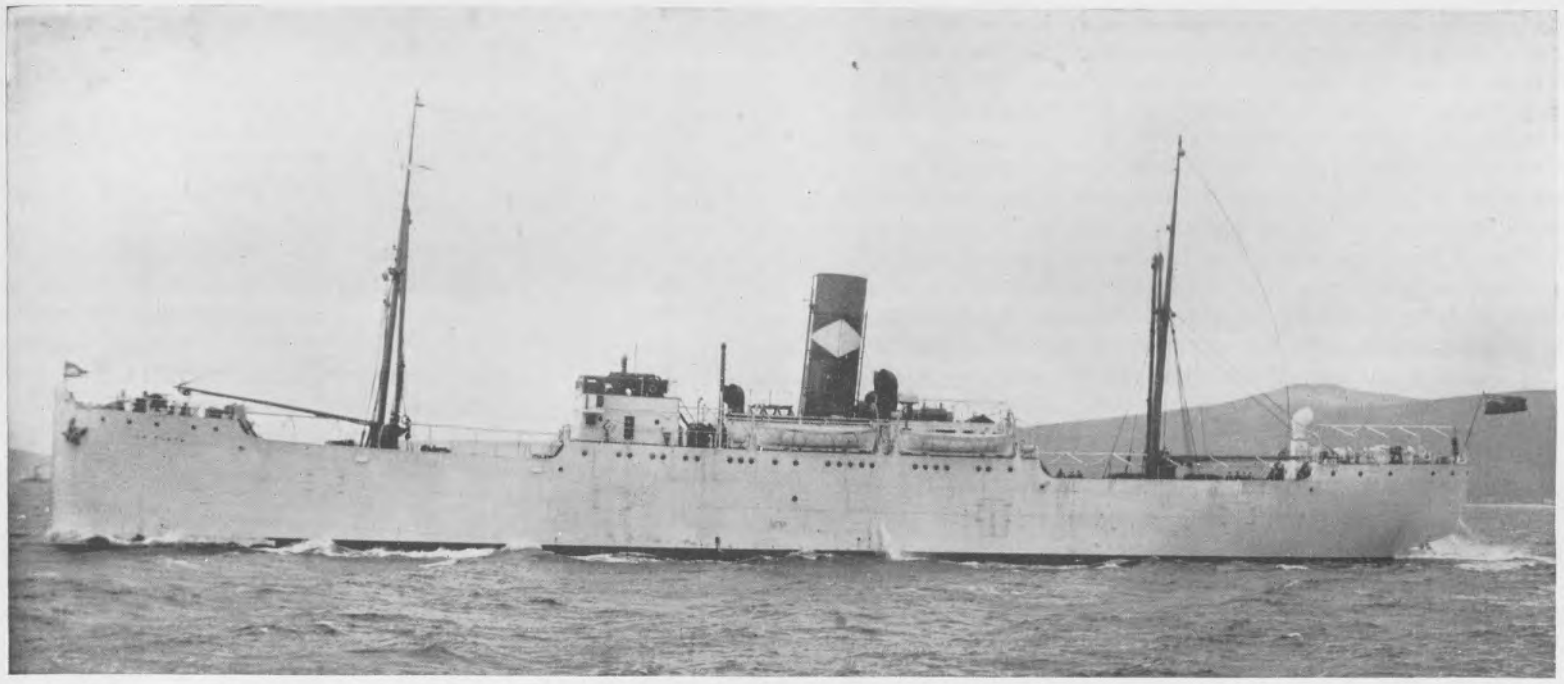


M.S. *La Playa* on her trial run

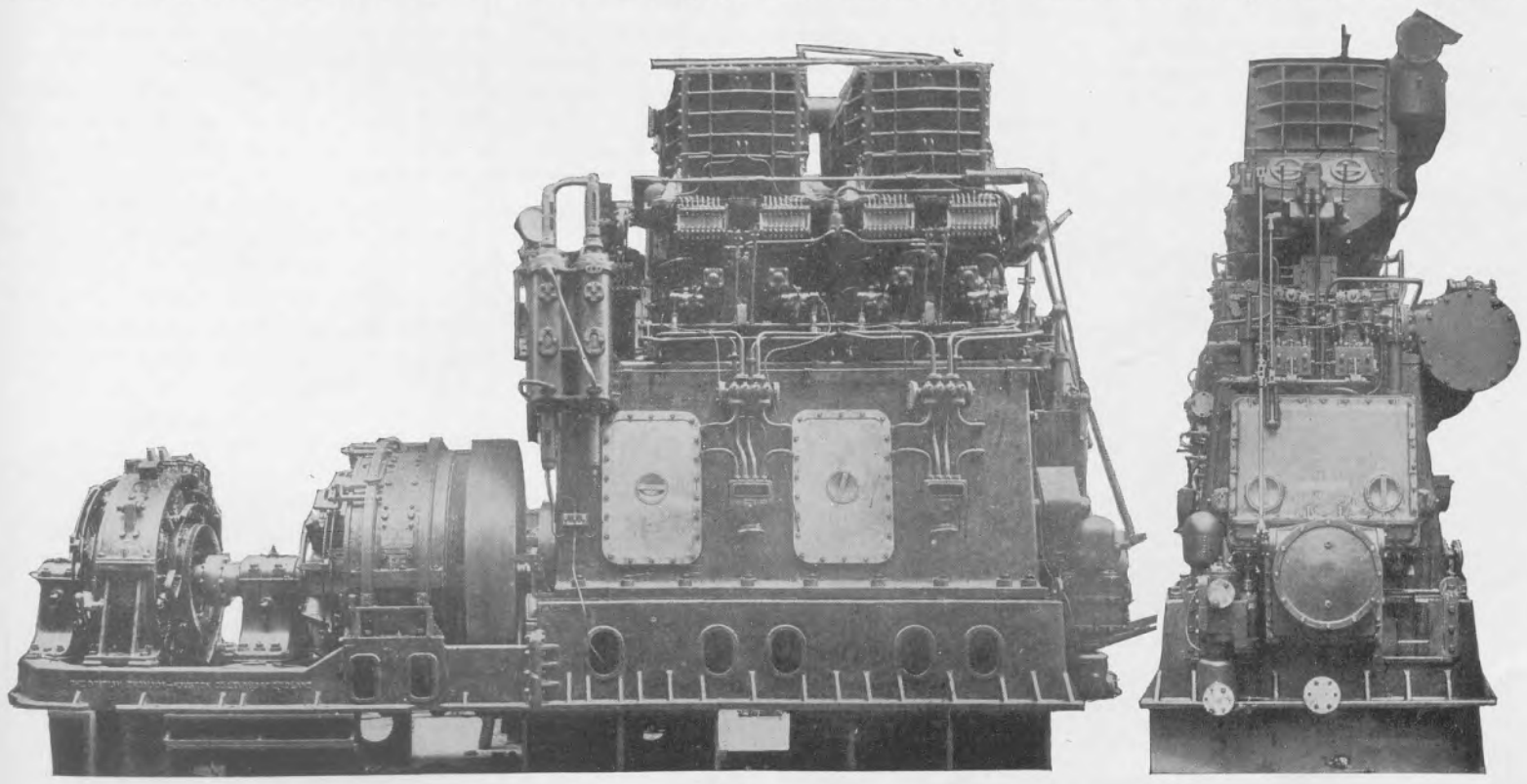
Diesel-Electric *Versus* Turbo-Electric

Motorship La Playa Carries 29% More Cargo Than Sister United Fruit Oil-fired Steamer

LESS than a year ago the United Fruit Company of Boston took a bold step in the ordering of three sister motorships, the LA PLAYA, LA MAREA and LA PERLA, from Cammell Laird of Birkenhead, England, for their banana and passenger carrying service. Previous to this order they had been operating their new turbo-electric steamer SAN BENITO and several reciprocating steamships of similar dimensions. Not only are their latest vessels the first of their type and power to have Diesel-electric drive, but the 3,000 shaft h.p. oil-engine plant in each boat itself is of an entirely new design. There is a possibility of this bold step proving to be a great stride in the development of economical merchant-ship propulsion, and regardless of the high first cost and regardless of considerable engineering opposition there is much interest at the moment in Diesel-electric drive, as is demonstrated by the appearance of several hundred important shipping men at the trial run. We were invited and arranged to be present, but several days before the arranged date a postponement was announced and to our disappointment we were obliged to leave England a few days before the changed date of the trial, although we had seen the engines being installed in the hull.

The United Fruit ships in a sense are partly American, as the owners are a domestic company, the firm that supplied the electrical equipment is associated with the General Electric Co. of Schenectady, and the builders are partly American owned.

If these craft prove very successful in service—as no doubt they will—there exists no obstacle in the way of extensive adoption of this form of propelling machinery in powers for large and fast passenger liners in sizes far beyond those now under construction with double-acting engines which now run up to 16,000 h.p. in twin-screws; at least, the only possible obstruction will be lack of courage and enterprise on the part of the man who must foot the bill—the ship owner to wit, coupled with the fact that the double-acting engine assuredly will grow in power simultaneously. This means that the Diesel-electric drive must show its all-around equality or superiority over the



M.S. *La Playa*—One of the four 825 b.h.p. Cammellaird-Fullagar stationary type Diesel engines and generators which form her propelling power

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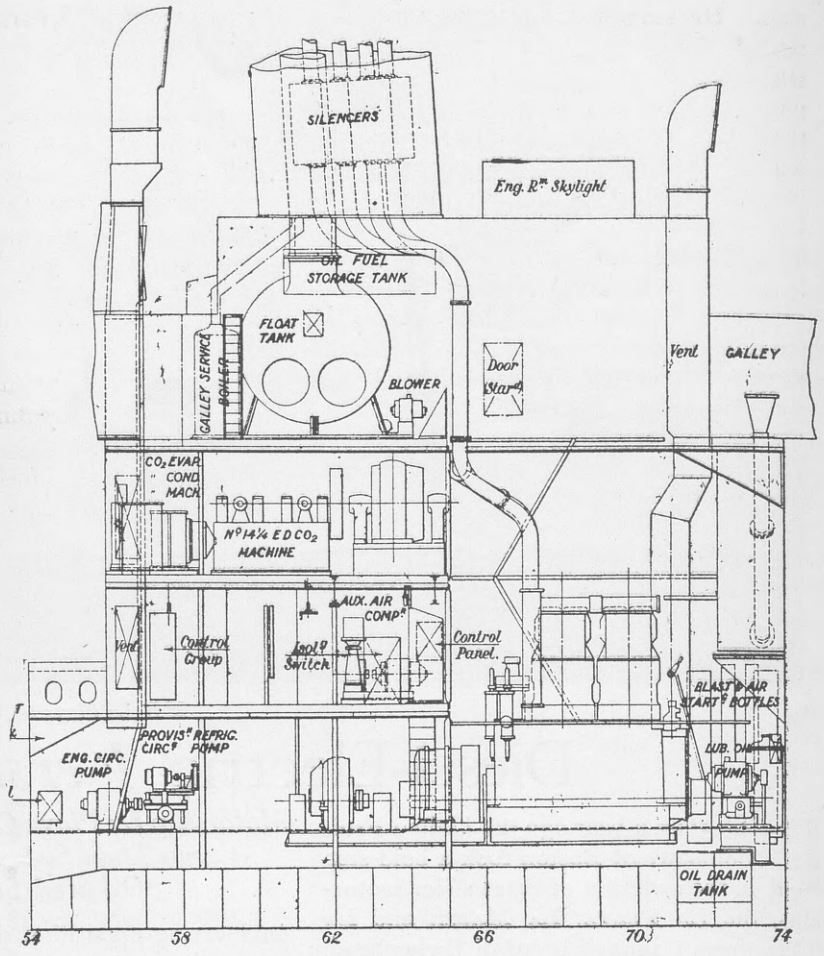
double-acting engine in powers above 20,000 h.p., as well as from 5,000 h.p. upwards. In ocean-going freighters from 1,000 to 5,000 h.p. the electric transmission has yet to demonstrate its superiority over the single-acting direct drive Diesel.

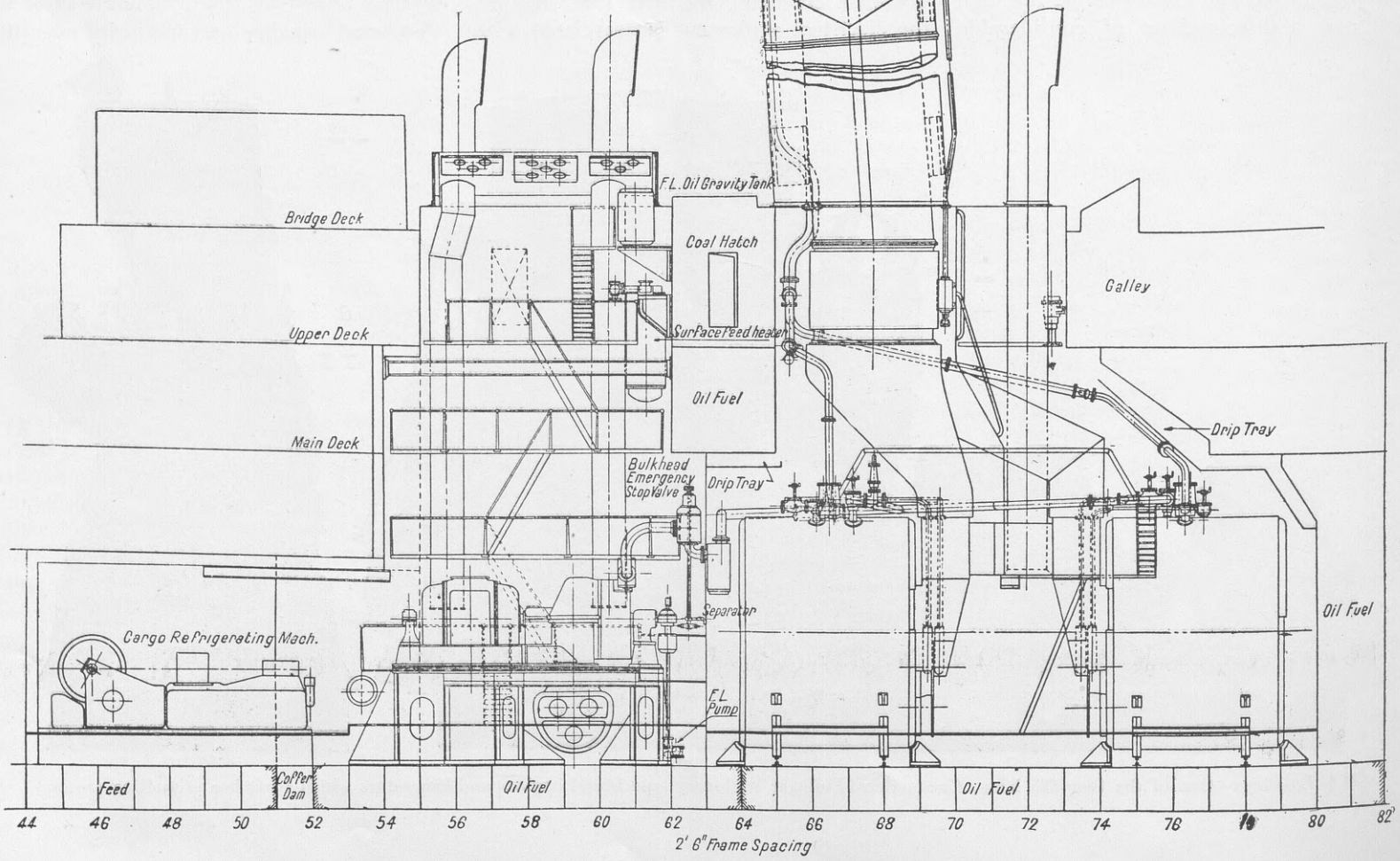
The completion of the first of the three United Fruit motorships recalls to our mind the occasion of an advertisement in MOTORSHIP having had not a little to do with the selection of Diesel-electric drive for their power. It was a page announcement run in the advertising section of our May, 1922 issue by the U. S. Representative of the builders that strongly impressed Capt. A. Davison, general manager of the United Fruit line, who until he saw this advertisement he was unaware that the Fullagar opposed-piston oil-engine had been developed for electric drive. In each of his three new ships there are four Diesel-electric sets of the same power and design as were illustrated in our May, 1922 number, which, by the way, was produced and laid on the Board table at the owners' directorate meeting when the construction was being planned at Boston with the builders representatives. This denotes the important part often played by good publicity in the organ of the industry, particularly when the advertisement itself carries a strong story.

At the luncheon on board held during the trial trip of the fruit-carrier LA PLAYA, Sir Percy Bates, deputy chairman of the Cunard Line, said that in going over the ship he had noticed an extraordinary omission, so in proposing a toast to Cammell Laird & Co., Ltd., he laid emphasis on the word "Limited" as he could stand in this fruit ship and say—"Yes, we have no bananas today!" R. V. Johnson, managing-director of the builders, stated that in deciding upon the machinery the owners had taken the view that if the type selected was good for one boat it was good for three. This, curiously, was the attitude adopted by The East Asiatic Co. in 1911, when they ordered the 7,500 ton motorships SILANDIA JUSTLANDA and FIONIA, a show of confidence that afterwards proved sound. W. L. Hitchens, chairman of the Cammell Laird, said he had never seen such a galaxy of engineering talent gathered together on one



La Playa—Sectional profile plan of the engine-room. There is a saving of space of 22 ft. 6 in. compared with the steam machinery of the turbo-electric fruit-carrier *San Benito*, illustrated below, to the same scale

Engine-room drawings of the turbo-electric fruit-carrier *San Benito*, sister to the Diesel-electric motorship *La Playa*. Drawings to exactly the same scale of the *La Playa's* engine-room are shown above. It will be noticed that the steam machinery occupies 9 more frame spaces, or 22 ft. 6 in., than the Diesel plant, without counting the refrigerating plant space



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ship. He supposed this motorship represented the most important development since the first turbine passenger boat in the nineties. Difficulties had been met, but they had been faced out and overcome during the construction. In ordering these ships Andrew Preston, President of the United Fruit Line, had performed a service of great value to the shipbuilding world. It required courage and money!

The LA PLAYA makes a remarkably fine comparison with her sister turbine-electric ship SAN BENITO, which has the same dimensions except a foot less beam. The new motorship carries 29% more bananas than the SAN BENITO at a little better speed on 13½ tons of fuel per day compared with 31 to 32 tons. She carries 26.7% more bananas than two other sister steamers with reciprocating engines belonging to the same line.

We are enabled to give machinery layouts of both the LA PLAYA and the SAN BENITO. In both hulls the frames are the same distance apart, namely, 2 ft. 6 in. The Diesel-electric drive occupies 20 frame spaces as against 29 frame spaces, or a gain of 22 ft. 6 in. turned over to cargo capacity. In this we have not included the greater space taken up by the refrigerating machinery of the steamer.

In view of the remarks on advantageous types of propelling machinery made at the Propeller Club by the Chief Engineer of the Federal Shipbuilding Company and published elsewhere in this issue, we draw his attention to these two sets of drawings and the benefits derived from use of oil-engines.

Regarding the LA PLAYA's fuel-consumption figures we have given, these are for full speed. However, when speed is reduced the consumption ratio per horsepower of the steamer increases, but with the Diesel-electric drive it remains the same, as two, three or more Diesel sets can be cut-out entirely and the remaining engines still operated at their most efficient revolutions. The SAN BENITO has superheaters in her three oil-fired boilers that work at 200 lbs. pressure and together have 8,533 sq. ft. heating surface. Steam is superheated to 200 degrees Fahr. She should be regarded as being very efficient for a steamer, making the comparatively low fuel consumption of the motorship all the more remarkable, especially as the power is the same in each case, namely 2,500 shaft h.p. at the propeller, but at 100 r.p.m., whereas the motor of the LA PLAYA delivers its output at 95 r.p.m.

There are four main Diesels in the LA PLAYA each of 825 b.h.p. at 250 r.p.m., and were constructed by Cammell Laird. Each engine is of the stationary opposed-piston, two-cycle crosshead type, with two cylinders 14″ bore by 16″ stroke of each of the two pistons per cylinder, or 32″ total stroke. Each is direct-connected to a British Thomson-Houston 500 k.w. 220 volt generator. Also on the same bed plate is an auxiliary generator of 200 k.w. at 220 volts, arranged in tandem with its main generator, which accounts for some of the differences of 800 b.h.p. between the combined output of the Diesels and the power at the propeller. These auxiliary generators supply power for the ship's lighting, heating and auxiliaries, including the large refrigerating plant.

Sub-division of the main oil-engines into four generating sets will afford a considerable operating economy that cannot be obtained from any ship with steam boilers. In the service for which these vessels are intended, as when proceeding south to the West Indies in light condition, only two or three engines will be necessary, whereas when returning north, fruit laden and with the refrigerating plant in operation, all the four sets will be required.

A further advantage of this arrangement is the security obtained against total breakdown—so essential where a perishable cargo is concerned—for with only two of the four units in operation a speed of about 10½ knots can be maintained.

Another reliability feature is that the Thomson-Houston propelling motor installed aft eliminating the shaft tunnel virtually consists of two motors in series. This is in order to develop sufficient power to maintain three-quarters ship speed should one-half have a breakdown. In this way the equipment, except for possible damage to the propeller, is equivalent to a twin-screw set. Two 18 h.p. electric motors drive big Sirocco fans for drawing air through the motors to keep the windings cool in tropical waters. All the propelling generator and motor fields are separately excited from one of the auxiliary generators, and starting, stopping, and reversing of the propeller are effected entirely by varying the excitation of the main generators or generator as the case may be. All the auxiliary, deck and fan motors were made by the Sunderland Forge Co.

When the vessel calls at Boston and New York on her regular route there will be nothing in her appearance for the casual observer to distinguish her from her sister steamers, except the absence of smoke; for she has a single stack containing the muffler, two pole masts, straight stem and a cruiser stern. She is classed by the British Corporation and by Lloyds, and complies with the U. S. Steamboat Inspection Department rules, and the British Board of Trade regulations.

Accommodation for passengers is provided by eight double-bedded staterooms, and a dining saloon. The officers are accommodated in a deck house on the bridge-deck forward, while the engineers and stewards are located under the bridge. Extensive refrigerating equipment is fitted on a platform in the engine-room, all electrically driven. The sets consist of two horizontal single marine-type CO_2 refrigerating machines and two centrifugal brine pumps. A smaller refrigerating machine with a separate pump is provided for cooling the provision chambers. Four air coolers (two forward and two aft) together with seven 35 in. Sirocco fans, deal with the air supply to the fruit chambers.

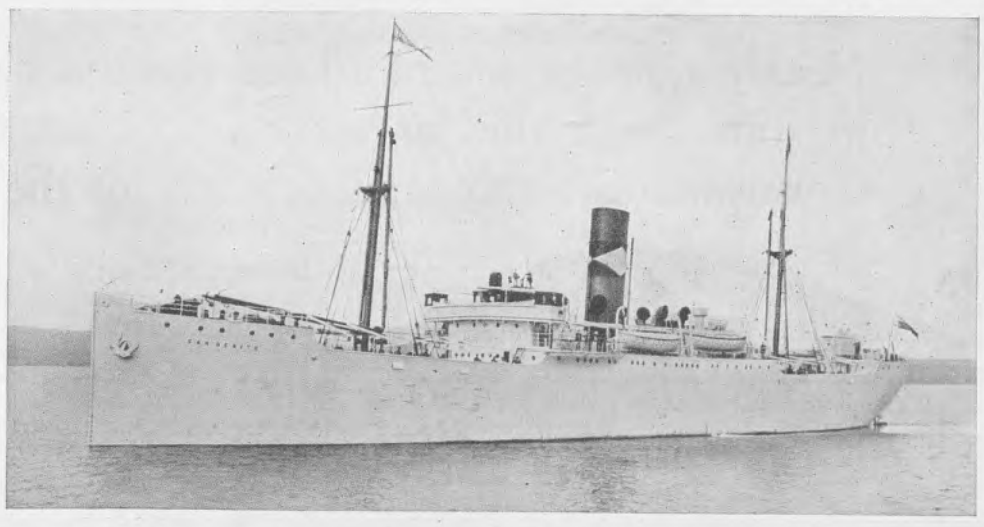
The British Thomson-Houston Company of Rugby, which built the main electric motors and generators, is associated with the General Electric Co. of America, who have furnished electrical main and auxiliary machinery for a number of domestic motorships.

The LA PLAYA has the following dimensions:

Hold-capacity (inside bins)	150,000 cu. ft.
Fuel-capacity	371 tons
Fresh water capacity	73 tons
Cruising radius	10,000 n. miles
Deadweight capacity	4,000 tons
Daily fuel-consumption	13½ tons
Daily fuel-consumption in port	1 to 2 tons
Power (at propeller)	2,500 shaft h.p.
Power of Diesel engines	3,300 brake h.p.
Length of machinery space	45′ 0″
Length	325′ 0″
Breadth	48′ 0″
Depth	31′ 9″
Speed, about	14 knots
Type of auxiliaries & deck machinery	Electric

Compared with one of the sister ships with reciprocating steam engines the LA PLAYA has a greater capacity by 32,000 cubic-feet. Thus she has a much larger earning power coupled with reduced fuel bills, wages and victuals. Her higher construction cost per deadweight ton is considerably offset by a lower cost *per net-cargo ton*, which after all is the most important factor when figuring upon first cost. In other words, for her capacity she has less constructional steel than a steamer of the same net-cargo capacity. Since the introduction of Diesel power, deadweight tonnage is no longer a criterion of a ship's capacity.

(To be concluded in December, when further illustrations will be given)



Turbo-electric fruit ship *San Benito*, sister to the *La Playa*. The Diesel-driven vessel carries 29 per cent more cargo on a consumption of one-third the fuel-oil

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